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MINNESOTA—A SKETCH

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OF the entire area of the State of Minnesota, 84,287 square miles, 27,850 came with the cession of Canada in 1783. The remainder lying to the west of the Mississippi River and a line from the sources of this stream to the present international boundary, about 56,437 square miles, came with the Louisiana Purchase. The greatest distance north and south across the state is nearly four hundred miles; its easternmost point is distant from its westernmost three hundred and fifty-four miles. Lake Mille Lacs is very nearly the geographic centre of the state.

The boundaries of the state are largely natural. They are entirely so from the Lake of Woods to Lake Superior. Along the eastern side, save for a distance of forty miles, a natural boundary separates the state from Michigan and Wisconsin. The Red River of the North defines the boundary lines against North Dakota.

The first settlement of the state, according to Warren Upham, was a temporary one by two French fur traders in 1659. They came to this country prompted by that spirit of wild adventure which has moved men to so many of the deeds recorded in the frontier history of North America. These men, Grosilliers and Radisson were their names, remained but few years when they were succeeded by the Hudson Bay Company founded in 1670. The coming of these French traders marked the founding of the fur trade, for nearly two hundred years the greatest commercial enterprise of the northwest.

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The territorial organization of Minnesota was accomplished June 1, 1849. The population of the territory was found to be in 1850 6,077. The state government was fully accomplished May 11, 1858. The population at this time could not have been above 150,000, and was made up largely from emigrants from the more eastern states, Wisconsin contributing a fair share. Following the close of the Civil War there occurred a great influx of foreigners, consisting mostly of Scandinavians, Germans and Welsh. The census of 1900 gave the following figures:

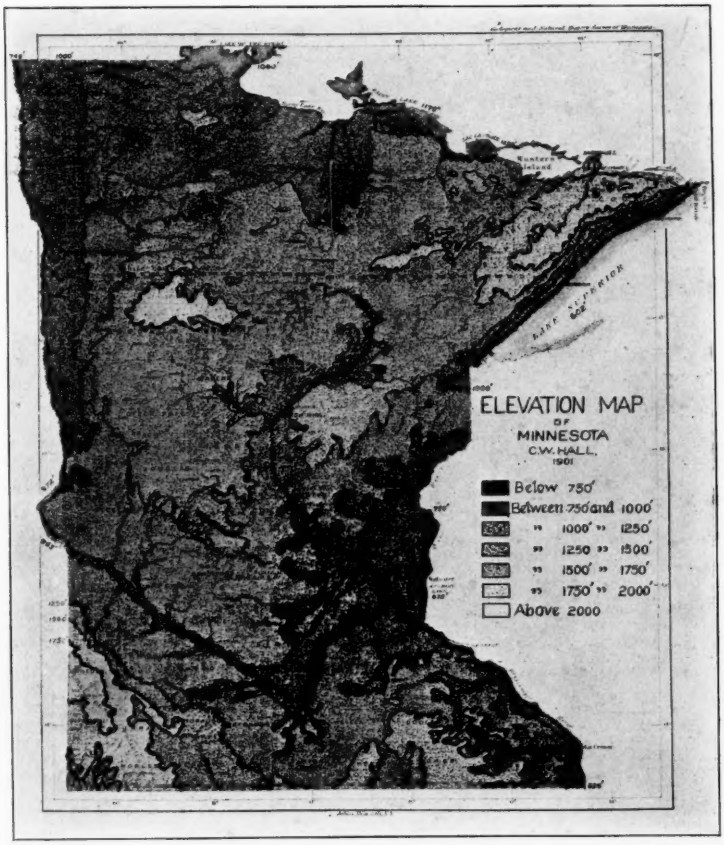
Total population	1,751,394
Males 54.2 per cent	932,490
Females 45.8 per cent	818,904
Native born	1,246,076
Foreign born	505,118
Native born of foreign parents	806,321
Native born of native parents	425,780
Colored, Negroes, Indians, Chinese and others	14,358

Of the foreign born population, when the state census of 1895 was taken, these nativity statistics are given:

Natives of Scandinavian countries	243,473
" " German countries	133,768
" " British Empire	94,868
" " all other countries	45,426
Total foreign born	517,535

Although Minnesota occupies a crest of the continent its relief is not high. The lowest land within the state is the shore of Lake Superior, 620 feet above the sea. The Mississippi River leaves the state at 620 feet. The Red River flows into Manitoba 748 feet above Hudson Bay, and Rock Creek in the southwest flows into Iowa at somewhat less than 350 feet above the sea. The highest points are in the northeast corner where the altitude of 2,230 feet is attained among the Misquah Hills. The next highest region is the Coteau des Prairies in the southwest corner where about 2,000 feet is attained. Between these two regions of comparatively high altitude lies a great intermediate valley through which the Red River of the North and the Minnesota-Mississippi make their way in opposite directions to the sea. The divide between them is only 975 feet above sea level. This altitude is the lowest point between the Dakotas and the Canadian northwest, the greatest grain belt of the continent, and Minneapolis the greatest grain manufacturing and shipping market.

Two facts of very practical importance may be named in connection with the contour of the state. The first is that Minnesota can not be a state peculiarly subject to floods. The long low slopes revealed by its relief will not roll off rapidly the melting snows nor



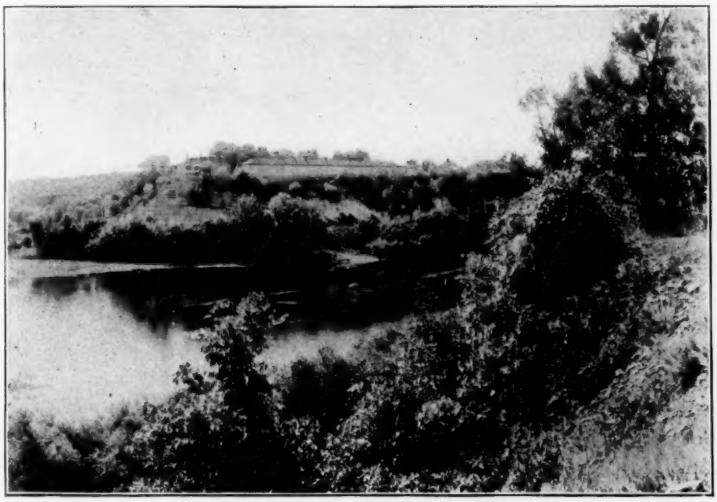
heavy rain storms. Lakes, swamps, and sloughs, so characteristic of the entire state, hold the water for a steady and uniform outflow. Nor on the other hand is the state a region of malarial marshes. High latitude doubtless determines this circumstance in large degree. The second is that a remarkably large percentage of the state's area is

well adapted to agricultural pursuits. Cultivation of the soil can be carried on with great success because of the gentle slopes and, therewith, freedom from heavy washing of soil and growing crops joined to easy transportation of farm products.

A great phenomenon of Minnesota's past is the glaciation of the Glacial period. During its successive epochs Minnesota was the home of glaciers; yet, within the great glacial field and lying partly in this state is that area of some thousands of square miles called the "Driftless Area." The complete story of glacial invasions can not yet be told; but it would seem that in the waning days of the closing epoch the glaciers advanced from great northern fields and again retreated in several directions. The story of this retreat is told in the long and quite continuous moraines that Upham, Todd, and others have described. As we gather the story of the later invasions from the lines of retreat we conclude there were three nearly contemporaneous ice lobes. The greatest of these, the one extending at its maximum further southward than Des Moines, Iowa, disappeared in its retreat by melting fitfully away up the Minnesota River valley and down the valley of the Red River of the North; a second retreated from the area of the present headwaters of the Mississippi in a northeasterly direction toward James Bay; and the third, which had passed from the east into the area west of the Mississippi River retreated by way of Lake Superior.

The evidence of these several invasions is seen in the direction of glacial markings upon the rocks; in the general direction of the moraines, and, thirdly, in the rock character and color of the glacial drift left on their retreat. There are frequent places where the contact of these masses of glacial drift with one another can be distinctly seen; that from the Lake Superior region has a prevailing red color and that from the Red River valley is as prevailingly gray; thus when in contact the line of division is sharply drawn, because a gray rock lies in contact with a red one. The effect of these ice invasions was twofold: In the first place the ancient rocks, weathered and decomposed, as the rocks of non-glaciated regions now are, were worn down and cleaned off to the fresh masses beneath. To-day, wherever a quarry is opened, whether it be of granite, quartzite or limestone the rock is fresh and marketable at its very surface. Again the soils of the state are almost wholly glacial. This means that the chemical composition is so varied, the rock contents being derived from every neighboring rock formation, that the soil is fertile for every kind of crop middle-temperate seasons will mature.

Thus it is seen, from a physiographic point of view as well as a political one, that Minnesota is a young state, excepting the few thousand square miles in the southeastern corner included within the driftless area of the upper Mississippi valley. It is probably not more than 15,000 or 20,000 years old. Some say it is less; Upham thinks that the great wheat garden, the Red River valley, is not more than 7,000 years. Youth is shown in a remarkably clear manner by the drainage features. Throughout the entire prairie and forest region the streams are immature; for the most part they are



FORT SNELLING STANDING AT THE CONFLUENCE OF THE MISSISSIPPI AND MINNESOTA RIVERS. THE MISSISSIPPI FLOWS DOWN FROM THE RIGHT THROUGH ITS NARROW GORGE. (PHOTOGRAPHED BY A. S. WILLIAMS.)

in the V-stage of valley erosion; many of them have not even reached that. Waterfalls and cascades are frequent and occur along every stream entering the Mississippi River from the west. The Mississippi River itself at Fort Snelling, Minneapolis and along its course from Lake Itasca gives strongest evidence of youth. The Saint Louis River at Duluth occupies a magnificent drowned valley, now waste-filled, and westward ten miles plunges down through the picturesque Dalles of the Saint Louis. The Red River of the North has scarcely determined its line of permanent drainage; nearly

every spring, before Lake Winnipeg is thawed out, it covers thousands of acres of Minnesota wheat land with its flood of waters. Along the north shore of Lake Superior is one of the most interesting successions of canyon gorges, waterfalls, and plunging streams to be found on the continent.

Thousands of lakes are scattered broadcast over the state. In some districts they are so thickly strewn that a single county contains hundreds of them. Ottertail is the banner county with her four hundred and thirty; Wright county, just beyond Minneapolis, contains two hundred and fifty-nine. In the southern part of the state lakes are fewer in number, a circumstance doubtless connected with relative post-glacial age; since, some hundreds of years ago, lakes must have been locally as numerous here as they are now in the northward-lying counties.

A SMALL LAKE AMIDST THE CHARACTERISTIC PRAIRIE FEATURES OF SOUTHWESTERN MINNESOTA, NEAR ST. PAUL. (PHOTOGRAPHED BY A. S. WILLIAMS.)

Lakes are of great economic significance. They afford vast storehouses of heat, since a water temperature of 75°F. at the close of the summer season is very commonly noted. They contain large numbers of excellent food fish—pike, muskelonge, black bass, white fish and lake trout are the choicest species. They afford enormous supplies of ice for summer use at home and for export. Scores of lakes are well-known summer resorts and everywhere they are attractive to the farmer who locates his buildings with reference to a beautiful lake shore.

But the lakes are disappearing. Swamps and marshes are taking their place. Swamps in turn partly by natural processes of insilting

and accumulating vegetable growth and partly again by artificial drainage are being filled up and converted into valuable hay meadows. They are thus being added to the list of the valuable land of the state, as have been before them many of the remarkable

A TYPICAL PINE FOREST OF NORTH-CENTRAL MINNESOTA.
(PHOTOGRAPHED BY A. S. WILLIAMS.)

glacial lakes in the basin of the moraines or in areas banked in by moraines, and in obstructed drainage basins, as in the magnificent Lake Agassiz of glacial time.

Subsequent to the glacial epochs the state has been taken possession of by a varied plant population entering it from every direction. The competition was for place and sunshine. So there

MAHONING MINE, MESABI RANGE. A TYPICAL "OPEN PIT" MINE. THE THIN COVERING OF GLACIAL DRIFT IS STRIPPED OFF AND THE ORE REMOVED WITH STEAM SHOVELS IN SUCCESSIVE LAYERS TO THE BOTTOM OF THE ORE BODY WHICH IS 80 TO 120 FEET BELOW THE SURFACE.

developed both forest and prairie. In the south and west portions of the state 32,000 square miles are prairie and in the north and east portions 52,000 square miles are forest. Within this forest has lain

and still remains a large portion of the wealth of the state. The pine forests of Minnesota have been the occasion and the scene of a marvelous economic movement. They made possible the almost unparalleled development of this state and the Dakotas. Whatever may have been the original amount of pine the present supply is estimated at 25,000,000,000 feet. A vast fortune still remains to the Commonwealth.

This hurried sketch can not be brought to a close without mentioning the natural power lying in the waterfalls of hundreds of streams; the inexhaustible supplies of clay in the glacial lake beds; the quarries of granite, quartzite, sandstone, dolomite, and limestone; and finally the vast stores of iron ore within the Vermilion and Mesabi Iron ranges. It is estimated that there has already been found and measured in the Mesabi range alone, not less than 500,000,000 tons suitable for making Bessemer steel. And there is more to be discovered. If the opening to the world of the Mesabi has revolutionized industrial Britain and made possible the trans-Siberian railway, what stupendous results may be awaited in the coming century when the remaining ore bodies are to be converted into metal.

MINNEAPOLIS AND ITS ENVIRONS

BY C. W. HALL, UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN.

THE visitor to Minneapolis and Saint Paul during the coming summer will see many points of geographic interest and scenic beauty. They illustrate almost every phase of physiographic process an inland locality can exhibit. A few of the more prominent features are summarized and the way to reach them pointed out in the following pages.

What is said pertains particularly to the cities named and a region within fifty miles. Some of the most charming spots in the state lie beyond the boundaries of the accompanying map. Many of them are well worth finding out. No one should return until some weeks have been spent a ıong the varied natural scenes Minnesota affords.

GEOLOGIC FEATURES.—The lowest formation exposed within the area of the accompanying map is Keweenawan. This occurs in a number of lava flows seen at St. Croix Falls, Taylors Falls, and im-

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mediate neighborhood. The famous Dalles of the St. Croix at Taylors Falls are cut into hard crystalline diabase.

The Cambrian occurs at St. Croix Falls and at Taylors Falls in shales abounding in fossils, and sandstones with interesting exposures of basal conglomerate. Exposures of these rocks are continuous down the St. Croix and Mississippi rivers to Iowa; along the Minnesota at St. Lawrence and southward to Mankato. The Ordovician is represented by the Shakopee (Calciferous) at Shakopee and other places along the Minnesota and Mississippi rivers. The St. Peter-Trenton is to be seen continuously within Minneapolis and St. Paul. The Glacial drift is everywhere and from a few feet to several hundred feet in thickness. It shows both modified and unmodified material in many typical exposures. That the drift came from two different directions is clearly shown by its color. One is gray; this came from the Red River valley region and the other in red, lying beneath the gray. This came from the Lake Superior masses of altered basic eruptives.

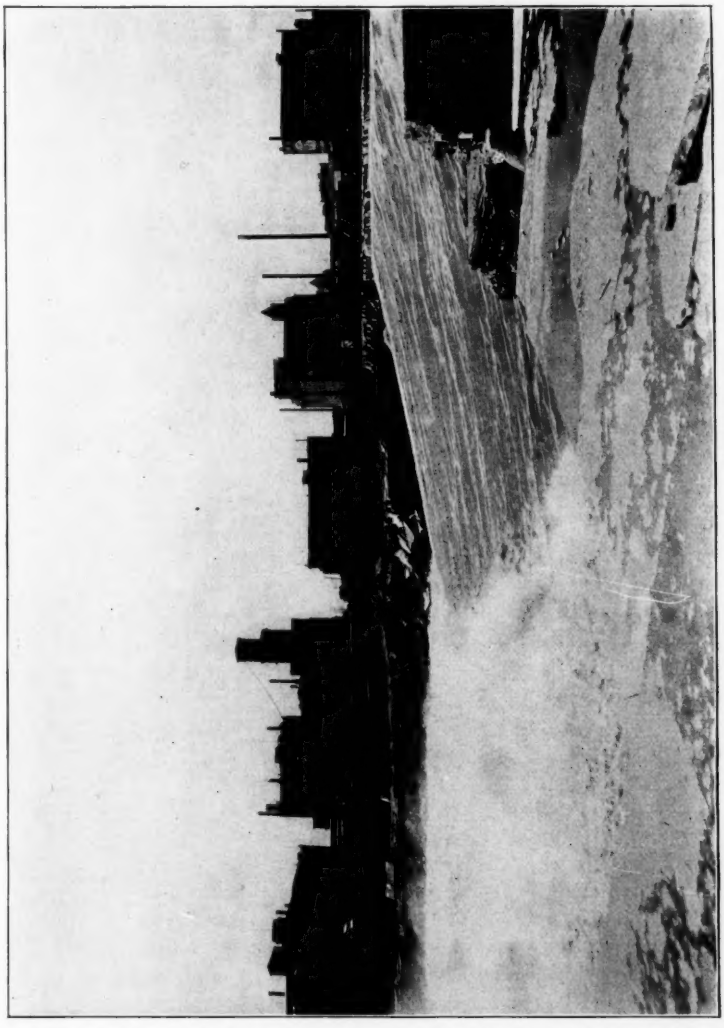
The geographic results of wind action are seen in Eolian deposits. They occur quite generally throughout both Minneapolis and St. Paul and thence northward. Nowhere are they more than thirty or forty feet in thickness. The brown gray color, uniform texture and non-stratified condition are persistent characters in this material.

Excursions.—Taylors Falls is reached by the Northern Pacific and St. Croix by the "Soo" Line. These towns lie on opposite sides of the St. Croix river fifty miles from Minneapolis. Volcanic rocks, Cambrian fossils, non-conformity, two varieties of Glacial drift in contact, river erosion and flood plain deposits are all seen. There are excellent home-like hotels in either town.

At Stillwater are good exposures of Cambrian rocks. An electric car runs half hourly through a charming stretch of rolling prairie and forest from the Twin Cities. Osceola, Wisconsin, on the "Soo" line affords trilobite-bearing rocks. The Ordovician can be seen almost continuously from the Falls of St. Anthony to South St. Paul, reached by many street car lines; also at Shakopee on the Northwestern line.

The Glacial drift can be seen along any railway or street car line. Contact of red and gray still occurs in South St. Paul, Western Minneapolis and in a beautiful exposure at Taylors Falls. A typically morainic region is traversed in going to Lake Minnetonka or to White Bear or to Stillwater from Minneapolis. Modified and unmodified

drift are seen beside the river, in the quarries and excavation embankments. Glacial Lake Hamline and its associates are seen from the



THE FALLS OF ST. ANTHONY—WEST CHANNEL WITH THE GREAT FLOUR-MILLING DISTRICT IN THE BACKGROUND.
PHOTOGRAPHED BY A. S. WILLIAMS.

car window on either interurban electric lines. Glacial *striæ* and rock displacement in the Malony quarry just below the State Uni-

versity. Dune sands are seen throughout both cities in street and railway cuttings. Many fine mounds occur north of the cities along the Eastern Minnesota railway between Coon Creek Junction and Cambridge. The State University campus is upon a sand dune from two to six feet deep.

STREAM PHENOMENA.—The Mississippi river within the two cities shows strikingly diverse features of stream action. Entering Minneapolis at Camden Place, where is located the pumping station of the Minneapolis water works, it is cutting its channel in St. Peter sandstone and modified Glacial drift. The current is so slow that the river is beginning to accumulate a flood plain.

In the heart of Minneapolis stands the modernized Falls of St. Anthony at the head of a remarkable gorge. This gorge starts at Fort Snelling, where it is 1050 feet wide and 150 feet deep, and extends backward more than nine miles, maintaining its depth through the slight rise in the surface and lessening in width only about one hundred feet. The fall at the cataract and rapids combined is 80 feet, making a horse-power of about 35,000. The falls are formed by a ledge of Trenton limestone overlying St. Peter (Chazy) sandstone.

At Fort Snelling the river empties into the broad old valley of the Glacial river Warren. This valley is from 4,000 to 15,000 feet wide. Its rounded, gently sloping sides on which the Glacial drift rests, covering the limestones and sandstones, are in marked contrast with the abrupt, sharply cut walls of the St. Anthony Falls gorge. While the walls of the river valley past St. Paul are now 150–200 feet high, artesian borings penetrate river silt 147 feet, thus pointing to a former gorge-depth of 350 feet and a rapidly-accumulating flood plain. It is possible that this slowing of the current and continual embarrassment to navigation may be associated with the continental sinking pointed to in other portions of the continent.

This gorge from the Falls of St. Anthony to St. Paul has become a classic spot to the geographer and geologist. It represents more concisely than any other river valley in America the difference in a river gorge made in the morning of the earth's history and another made last evening. The Glacial epoch marks the time separating the two. The visitor standing upon the river bank opposite Fort Snelling two hundred paces south of the end of the street car line gazes upon the two, close before him and in actual contact. The recession of St. Anthony's Falls has been seized and wrought into one

of the most accurate measuring rods for determining post-Glacial time North America affords.

The Minnesota river, flowing from Shakopee to St. Paul, thirty miles, falls but one foot. The expected can be seen; numerous ox-bow lakes and other forms of abandoned channels characterize the whole distance. Sloughs and marshes, due to extensive insilting at its mouth by the younger and more vigorous Mississippi, afford feeding grounds for thousands of geese and ducks in their migrating seasons. The Minnesota valley above Fort Snelling has every appearance of age shown by the Mississippi valley below their confluence.

Among the many side gorges of the great rivers named none is more beautiful and unique than that of Minnehaha Creek. Here can be clearly traced abandoned channels of the Mississippi as it has wandered before and during the period of gorge-cutting. The Soldiers' Home stands on a veritable Goat Island, now become a part of the river's west bank. Others between Minnehaha and the Falls of St. Anthony are the delightful nooks where Shadow Falls, Bridal Veil, Fawns Leap and Lovers Leap pour over the escarpment of the gorge. An added interest lies in the flora the botanist finds in these shaded spots. Opportunity is here given to secure a number of characteristic species of Minnesota plants. Above Fort Snelling, along the Minnesota river through Bloomington and Eden Prairie, copious springs issuing from the bluffs of the river make a veritable paradise for botanists.

The St. Croix river can be seen to advantage at many points. The Falls of St. Croix, the clear-cut terraces of the higher streams, the Dalles, the lower Dalles and the bluffs of Cambrian shales and sandstones are everywhere beautiful and well worth visiting. The dam which the Mississippi has made at Point Douglas, thereby forming Lake St. Croix, is a typical study. The falls of Willow river in Wisconsin make a pleasant spot. Artists frequent the place because of beautiful scenic effects. The geologist will find Cambrian rocks and the geographer will observe one of the new waterfalls this portion of North America affords.

Excursions.—To reach Chaska and its extensive industries the Northwestern Line is the best for giving glimpses of the beautiful Minnesota river valley. Minnehaha Falls are reached by the Minnehaha trolley line from Minneapolis. A walk of two miles from the falls to Fort Snelling through the park and across the railway will

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show many beautiful and striking views of river scenery. The Snelling trolley car takes one into St. Paul past many points of interest; or what is of still more scenic importance, a steamer plies on the river several times daily between the Soldiers' Home and St. Paul; for twenty-five cents a rare bit of scenery can be enjoyed. The older part of the valley is seen by taking the Concord street line in St. Paul to its end and spending an hour or so in climbing to some of the highest points in this neighborhood. The same district can be seen from a still different point by taking the Maria Avenue car to Indian Mound Park. The West St. Paul car takes one to the south end of the highest bridge, a point overlooking a most beautiful stretch of river gorge and within easy access of the West St. Paul brickyard. where are some of the best collecting grounds for Ordovician fossils to be found in the Northwest. They lie in the calcareous shales that form the upper Trenton. In Minneapolis the Camden car will carry one to the Minneapolis pumping station, in which vicinity are many features of river erosion and wind action.

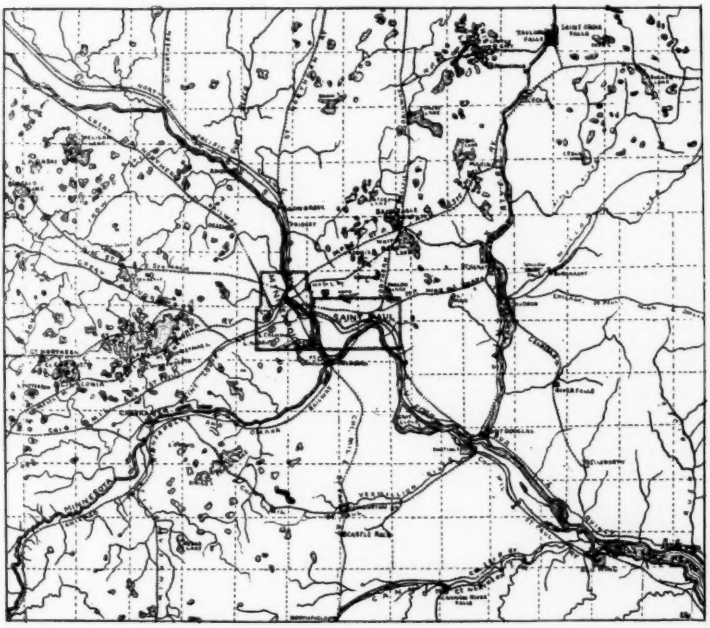
LAKES.—Lakes of several types are within easy reach; in the city limits of both Minneapolis and St. Paul are beautiful examples. Lake Como of one hundred and forty-two acres is the central feature of Como Park, St. Paul. A ride of an hour or less by rail will take one to Lake Minnetonka, by far the most beautiful as well as the most utilized. White Bear, Bald Eagle, Christmas, Waconia, Minnewashta, Centerville, Vadnais, Johanna, Anderson, Independence, Medicine, Gervais, Phalen and many others are also near.

Abandoned drainage channels afford others within Minneapolis. Cedar Lake, Lake of the Isles, Lake Calhoun and Lake Harriet are among the most attractive. These lie in a channel of the Mississippi river used before the Fort Snelling-St. Anthony gorge was begun. The map shows the general direction of this channel through the west part of the city.

Floodplain lakes too are represented by typical examples, the finest of which are within the Minnesota river area. Long Lake near Fort Snelling is soon succeeded by Ferry Lake, Grass Lake and Dick Lake as one traverses Bloomington and Eden Prairie townships. Others lie on the opposite side of the river. Below St. Paul in the Mississippi channel are many, Pig Eye being the classic example.

Of silted river lakes there are within easy reach two eminent examples, Lake Pepin and Lake St. Croix. The silt brought down from northern central Wisconsin by the Chippewa river dams the

water of the Mississippi river, forming Lake Pepin and causing it to set back twenty-five miles from the confluence. Indeed it extended five miles further before the Cannon river pushed into it its constantly lengthening mud flats. Lake St. Croix is formed by the silt-load of the Mississippi laid within the St. Croix channel at the confluence of the two streams. (The study of Pepin and St. Croix will



MAP OF THE ENVIRONS OF MINNEAPOLIS AND ST. PAUL, SHOWING THE PRINCIPAL RIVERS AND LAKES. BY C. W. HALL.

show that whether the resulting lake lies in one channel or the other it is due to the relative rate of descent of the confluent streams.)

Excursions.—Lakes Como, Harriet, Calhoun, Cedar, White Bear, and Lake of the Isles are within easy reach by street cars, so easily found that names are unnecessary. Many daily trains take visitors to Minnetonka, White Bear, Bald Eagle, Elmo, Forest and the Chicago lakes, where excellent hotels are always available, with the attendant recreation privileges of rowing, sailing, tennis, ball and croquet.

Farther but within easy reach are the following summer resorts among the many which eastern Minnesota affords: Buffalo, Pulaski, Clearwater and Glenwood lakes, on the "Soo" line; Spring and Prior lakes on the "Milwaukee"; the delightfully restful spot, Waterville, built between Lakes Tetonka and Sakata, abounding in fish, is reached by the Minneapolis and St. Louis and Chicago Great Western; Waconia, Minnewashta and others are on the Minneapolis and St. Louis; the Great Northern touches Waconia, Pelican and other attractive lakes. The "Burlington" carries the visitor to Point Douglas and Prescott where the foot of Lake St. Croix can be studied; the Burlington and Milwaukee both pass the head and foot of Lake Pepin, which, with Lake St. Croix, is probably the most typical example in America of lake-building by river silting.

Going farther are scores of lakes which cannot be mentioned here; but note must be taken of the unequalled Lake Park region of western central Minnesota. In this region lakes are counted by the thousand. Every county has its many cozy, quiet, home-like hotels beside lakes and within beautiful groves. Fishing and bathing, rowing and sailing, walking and wheeling can be secured to the heart's content.

PARKS.—Both Minneapolis and St. Paul have quite elaborately planned systems of parks and parkways. Over three thousand acres in the two cities have been dedicated to the comfort and pleasure of the people. Over fifty miles of parkways give abundant driving and wheeling. Many miles lie along the summit of the bluff walls of the Mississippi river on both east and west sides and constitute, as eminent landscape architects agree in saying, stretches of picturesque river scenery and forest environment unequalled in the Mississippi valley. A delightful drive is along the miles of shore line enclosing Lake of the Isles, Calhoun and Harriet.

Among the more interesting parks in the two cities may be mentioned Como Park, the largest in the Northwest, which preserves as its central feature Como Lake, one of the most beautiful of Minnesota's gems, one and one-half miles long and over one hundred and forty acres in extent; Indian Mound Park, guarding an ancient burial place on one of the most sightly spots the Mississippi valley furnishes; Loring Park, and the environs of Lake Harriet are restful; Columbia is the roomiest of park areas, and the Agricultural College farm the one of most varying interest.

Park Excursions.—It is scarcely necessary to name the routes

to the leading parks. The parkways may be reached by several lines, Minnehaha line, Como-Harriet, Eighth and Central, Washburn Park and Camden Place in Minneapolis; Maria Avenue, Fort Snelling, Groveland Park and White Bear in St. Paul are the electric car lines to the places of greatest interest. Park management always aims to preserve natural feature of surface and plant populations. Everywhere the relations of the new to the old are readily seen.

THE STREET RAILWAYS.—Minneapolis and St. Paul are together served by the Twin City Rapid Transit Company, an organization that operates three hundred and fifty miles of double tracks in the two cities and their suburbs. Large, roomy, clean cars run promptly; transfers are given in an exceedingly liberal manner. The leading lines are given on the accompanying map; by them long distances can be compassed in brief time and at very low cost. Outside the cities White Bear Lake and Stillwater are quickly reached.

PUBLIC BUILDINGS.—Churches are the first structures to be mentioned both because of their number and the millions of dollars invested in them. Every denomination is represented in the religious life of these cities and nearly every one has the centre of its state interests located here. Some of the finest structures are Westminster, Wesley, First Baptist, First Congregational, Church of the Redeemer in Minneapolis; the Cathedral, Park Congregational, and others in St. Paul.

The new capitol, costing $3,000,000; a new post office, $2,000,000; a city hall, $1,000,000; a modern jail, are interesting to one visiting St. Paul; Minneapolis invites you to see the city hall to cost when completed, $3,500,000; public library, $334,000, in which is housed the largest city library in the West, and its chamber of commerce, $1,000,000, planned, when completed, to house the largest grain and flour business carried on at any one city in the world.

THE PUBLIC SCHOOLS.—It is safe to say that the schools of Minneapolis are above the average of the country. The names of the men who have guided their destinies during the last thirty years, Tousley, Bradley, and Jordan—only three—are sufficient evidence of quality. Were other evidences necessary the names of the one hundred and fifty-three teachers now here who have served fifteen years or more and are still leaders in the corps of eight hundred and fifty might be mentioned. Hundreds of others could be given. The enrollment is now 40,000, of which 2,700 are in the four high schools.

St. Paul has a school system of which she is truly proud, 27,000 pupils, and three high schools enrolling 1,800 pupils.

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There are in addition to the public schools many private and religious schools. Catholics and Lutherans maintain most of them. The number enrolled in these schools is in the thousands; their work is of excellent character and their teachers are eminent for enthusiasm and thoroughness.

EAST HIGH SCHOOL, MINNEAPOLIS.

UNIVERSITIES AND COLLEGES.—Minneapolis is in an educational centre of which St. Paul is also a goodly part. The University of Minnesota is the oldest and chief among the institutions of higher learning. Its roll of instructors numbers 225, of students, over 3,500. Its campus of fifty acres, skirted by the Mississippi river gorge over one hundred feet deep on its west side, will be a point of interest to the National Educational Association visitors in July. The Agricultural College and School two miles away on a high and sightly spot with its hundreds of agricultural students commands the interest of the world on account of its almost perfect adjustment to the needs of the agricultural community. The fields, gardens, groves, and buildings of this department of the State University are well worth a visit of inspection.

A NUMBER OF THE BUILDINGS OF THE UNIVERSITY OF MINNESOTA.

Hamline, the Methodist university of the State, is within sight of the Agricultural College and upon a plain once the bed of a Glacial lake, named by Upham, Lake Hamline. It is a flourishing institution of 500 students.

Augsburg Seminary, an institution of general culture devoted to the specific work of preparing for the Norwegian Lutheran ministry, is flourishing under the support of one of the branches of the

Scandinavian Lutherans, the strongest Protestant sect of the city. Macalester College receives continually increasing support in students and means from the Presbyterians of the State. Hill Seminary is well endowed and is increasing rapidly in numbers and prestige among the Catholics of the West. Its situation is one of exceptional beauty. The United Church Seminary is a young and flourishing institution. It has recently erected a hall for lecture rooms and dormitories at the expense of $150,000.

Other colleges are here also, but all cannot be named. Enough have been mentioned to show that at the "Twin Cities" is rapidly developing a centre of educational activities which already commands wide interest.

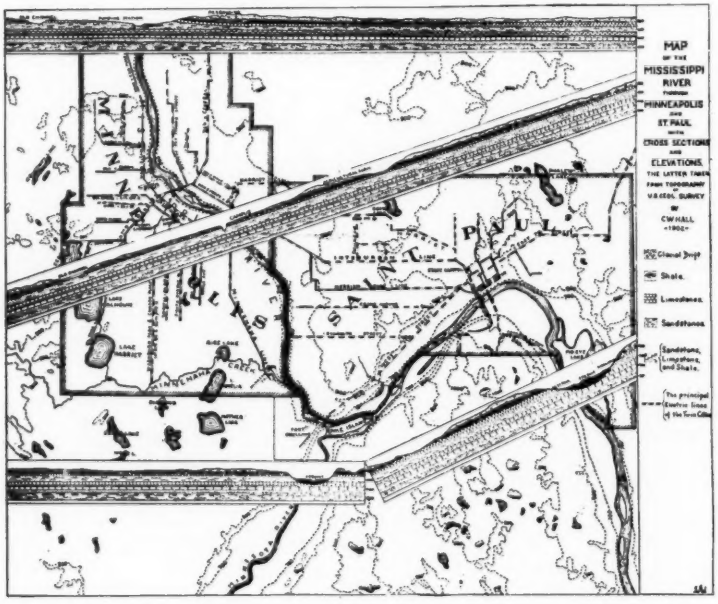
Excursions.—The high and graded schools should be reached without specific direction here. The East High School will become familiar to all visiting teachers during the convention. The State University will be used for a number of sectional meetings. The Oak and Kenwood and both interurban lines pass near its grounds. The Agricultural College is a ten-minute walk distant from the Como-Interurban-Harriet line. Hamline University has the "Hamline" cars from St. Paul and is a ten-minute walk along Snelling Avenue from either interurban line. Macalester College is in Merriam Park, a suburb of St. Paul, accessible by the Selby-Merriam Park cars in St. Paul and by transfer from Interurban to Prior Avenue from Minneapolis. Hill Seminary is at the end of Groveland Park line of St. Paul. The Evangelical Lutheran Seminary is in St. Anthony Park on the Como-Harriet line. Augsburg Seminary at Twenty-first Avenue South, Minneapolis, is near Riverside and Minnehaha cars.

ECONOMIC GEOGRAPHY.—Minneapolis, "the City of the Waters," owes its founding and development to the Falls of St. Anthony. Thirty-five thousand horse-power, with thousands more to be developed as soon as needed, means important industries and a properous community. There is no better example in the United States of the growth of a city from the development of its natural surroundings than Minneapolis affords.

Quarrying and Brick-making.—Underneath a considerable portion of the cities the Trenton limestone extends as a formation 15 to 30 feet in thickness. Along the Mississippi gorge and many places outside this natural channel this bluish-colored stone crops out. It is quarried and wrought so easily that it is universally used for

foundations and its better grades for the walls of beautiful churches and other structures.

There are several centres of the brick industry; Chaska lies up the Minnesota river only twenty miles southwest of Minneapolis. The material is modified drift or lacustrine clay lying below the later (Wisconsin) till at Chaska, under nearly identical conditions are the neighboring towns of Carver and Jordan. The annual output, chiefly ordinary building brick of several qualities, is nearly



30,000,000. West St. Paul is another centre where bricks are made of Ordovician shale crushed, molded and burned. The methods of treatment produce several varieties of choice building brick. Last year the amount reached 10,000,000. North Minneapolis is the greatest centre of brick-making in the Northwest. Over 35,000,000 was the reported output last year. Princeton makes 15,000,000 yearly also of Glacial clays. At Red Wing is one of the largest plants for common pottery-making in the United States, the product reaching millions.

Excursions.—Chaska, Carver and Jordan are easily reached; three railways pass them. To reach the West St. Paul yards a walk is necessary after leaving the street car, but the place is an important one. The North Minneapolis yards are reached by the Camden line on the west and the Second street on the east side. One of the best limestone quarries to visit is the one a few blocks below the State University.

Lumber Manufactures.—The first comers to the Northwest saw the immense possibilities of the situation; the men who had secured possession of the enormous pine land tracts by Indian treaties seized them. Lumber manufacture for the down-river markets began in 1848 and has been prosecuted until here stands the greatest lumber

THE MILLING DISTRICT, MINNEAPOLIS.

manufacturing centre of the world. The saw-mills of Minneapolis should be seen. The Backus-Brooks mill holds the world's record, having cut more than 840,000 feet in a single continuous run of eleven hours. The annual output of lumber at the Minneapolis mills is now about 600,000,000 feet. The standing pine of the State is now estimated at 25,000,000,000 feet. But there are many other mills for cutting it in addition to those in Minneapolis. The mills are in the heart of the city and can be reached within a few minutes from any hotel.

Flour Manufacture.—As soon as wheat fields were cultivated flour mills were running. From the small beginning represented by a single old-fashioned run of stone the present output has grown. Many thousands of people are engaged in this industry.

The mills are well worth a visit. The largest in the world, the Pillsbury A, is inspected by thousands of visitors every year. Realizing the interest people have in the process of flour making the owners keep one employee whose duty it is to escort visitors through the mill from top to bottom. The daily capacity of this mill is

10,000 barrels. The Washburn C mill is next in capacity, making 9,000 barrels a day. The total output of the city is 16,000,000 barrels yearly, much greater than that of the next largest flour manufacturing centre of the world. The mills are with one exception located around the Falls of St. Anthony and are of easy access. Admission is by permit secured at the office, Guaranty Loan Building, or at the mills.

A MARINE BIOLOGICAL STATION ON THE STAITS OF FUCA

BY CONWAY MACMILLAN, PROFESSOR OF BOTANY, UNIVERSITY OF MINNESOTA, MINNEAPOLIS.

AMONG the excursions planned to follow the meeting of the National Educational Association in Minneapolis next July, that to the Minnesota Seaside Station on the Straits of Juan de Fuca, while especially designed for biologists, offers peculiar advantages to students of geography. Those who have crossed the Continent and have visited the Pacific slope can never forget the intellectual and æsthetic inspiration of the plains, the mountains and the sea; those whose travels have been circumscribed within the eastern United States and Canada can appreciate the broadening influence of a transcontinental journey only by experience. It was with this in view, among other considerations, that the west coast of Vancouver island was selected for a marine station in connection with the University of Minnesota. In 1901 the laboratory was opened and enjoyed a most successful season, a brief account of which is given in the *Popular Science Monthly* for January, 1902. Papers setting forth certain of the scientific results are in press in *Minnesota Botanical Studies, Postelsia* and elsewhere and will soon be ready for distribution.

It is the purpose of this brief article to indicate the nature, route and conditions of the excursion of 1902 from Minneapolis to Port Renfrew and the Seaside Station. The party will leave Minneapolis in special cars the evening of July 12th, making stops on the westward journey in the vicinity of Calgary and at the Great Glacier. It will proceed via Victoria to Port Renfrew and will remain a

month at the Station. It will return to Minneapolis by the first of September, making two stops, one at Sicamous and the other at Lake Louise. Members will thus be enabled to see the prairies and the mountains at their best and will have time for zoölogical and botanical collections so far as they may desire to make them. This, in addition to the month of intimate acquaintance with the sea, will in itself constitute a very fair course in ecology and will present many geographical and geological facts in such a way that they can never be forgotten.

The object of the Station on Vancouver Island is to furnish a base for morphological and physiological work upon the plants and animals of the west coast of North America. Unlike other stations in the United States and Canada, it has been established without requests for state or government assistance and without importunities addressed to the various universities, colleges and learned societies to contribute to its financial support. It represents a natural impulse and a natural group of students and investigators and has arisen in response to their needs. Its methods and life are unlike anything else in America and might be described as an attempt to return to the simplicity and single-minded enthusiasm of the first American marine station, that at Penikese. Quite unhampered by the conventionalities and constraint of urban or even suburban life, its group of students learn to become imbued with the spirit of the sea. In selecting a site for the buildings only one point was considered of paramount importance, and that was the richness and accessibility of the marine flora and fauna. Certain inconveniences of travel and difficulties of transportation and subsistence were given little weight in comparison with the presence of the many natural advantages which, taken together, make the Minnesota Seaside Station one of the best localities for marine collection on either coast of the continent. Days spent beside its tide pools, among its kelp beds, or at the table in its laboratory, and evenings of song and story around the bonfires of its "uproarious beach"—in the words of Robert Louis Stevenson—will always be marked with a white stone in the memory of those who enjoyed them in 1901.

To the readers of the JOURNAL OF GEOGRAPHY whose interest in nature study in all its forms may reasonably be assumed, but whose particular studies have been directed along geographical lines, a somewhat more detailed description of the route to the Station might prove acceptable.

Starting from Minneapolis, situated among the morainic hills of southern Minnesota, the line of the "Soo" Railway crosses the southern edge of the forest district of Minnesota. As far west as Payneville the country is mostly wooded with oak, poplar and elm, and there are numerous lakes, the train being in sight of one or more most of the time. This is the well known Lake Park region of the fishermen and hunters. It is by no means an unsettled region, but comprises some of the best farming land of central Minnesota, the

FIG. 1. SHORE OF A LAKE IN SOUTHERN MINNESOTA.

dairy industries, truck farming, and horticulture having been brought to a high degree of development. Beyond Payneville, which is ninety-two miles west of St. Paul, the trees begin to disappear and soon a rolling prairie opens up, with here and there a tree-fringed lake, notable among which is the beautiful Minnewasta at Glenwood. About forty miles farther west the bed of the extinct Lake Agassiz is entered near Elbow Lake and its lower end is crossed to Hankinson, North Dakota, two hundred and sixteen miles west of St. Paul. Through this district, the absolutely level prairie with the fields of

wheat stretching beyond the horizon, the shimmering mirages of the summer days, and the cool breezes of the evening, give one for the first time a sense of the Great Plains. From the western edge of the ancient lake the route is through a more or less open and treeless country with, however, occasional groves and gallery woods along the streams. The Cheyenne River is crossed first near Anselm, two hundred and fifty-nine miles west of St. Paul, and again near Valley City, forty miles farther to the northwest. The northwesterly course is continued, crossing the James River west of Kensall three hundred and fifty miles from the starting point and following

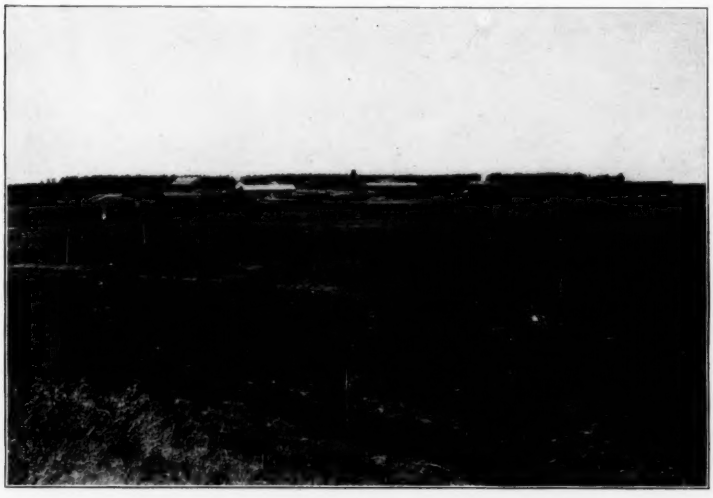


FIG. 2. IN THE RED RIVER VALLEY.

a straight diagonal through Carrington and Fessenden almost to Minot, four hundred and seventy-nine miles from St. Paul. This, the most important town in northwestern North Dakota, lies in the valley of the Souris River, which, rising in southwestern Assiniboia, makes a loop into North Dakota, thence into Manitoba, where it joins the Assiniboine and flows into Lake Winnipeg.

At Portal, five hundred and sixty miles from St. Paul, the Canadian boundary is crossed; at Estevan, twenty-five miles farther north is another bridge over the waters of the Souris, and the country becomes more broken through to Moose Jaw, seven hundred and

twenty-eight miles from St. Paul, and at an altitude of 1,725 feet above the level of the sea. From Moose Jaw through to Calgary, a distance of about three hundred and fifty miles, there is a steady increase in the elevation, bringing one at the last named point, 3,388 feet above the level of the sea. The high plains of western Assiniboia are in many respects of surpassing interest. There is a look of vastness about them, settlement in this region having not yet pro-

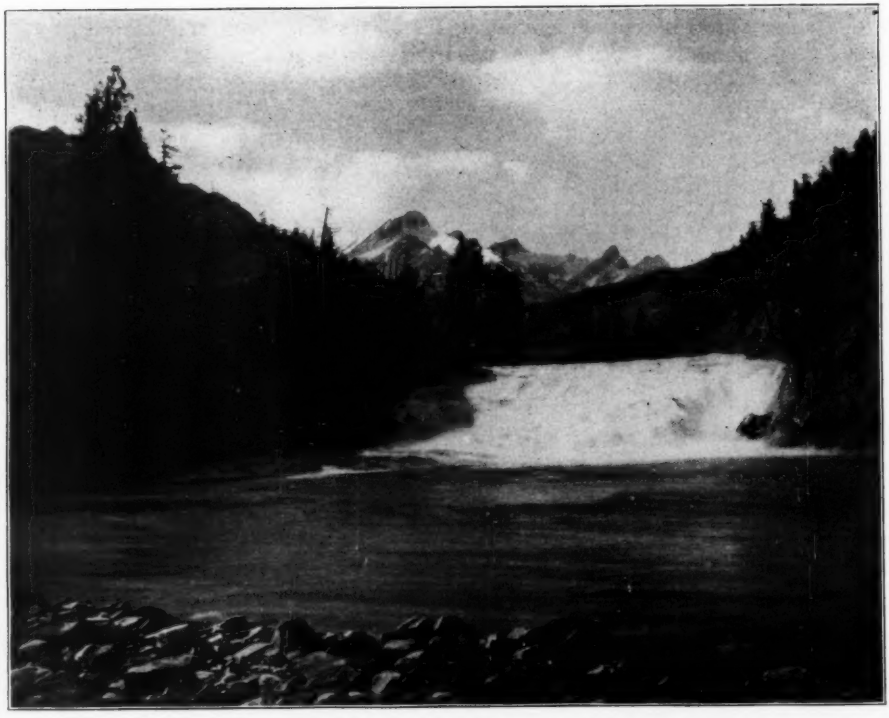


FIG. 3. FALLS OF THE BOW RIVER, CANADIAN ROCKIES.

gressed to such an extent that the traveller is everywhere confronted by the evidences of civilization. One may journey for many miles without seeing a human dwelling or any sign of life except the wild birds and beasts of the prairie. There are many alkaline lakes and the country is furrowed by innumerable trails of the buffalo. These paths, perfectly well marked as if they had been trodden but yes-

terday, run off though the canyons and over the hills, producing a somewhat depressing effect upon the lover of nature when he remembers how completely these wild cattle of the plains have been de-

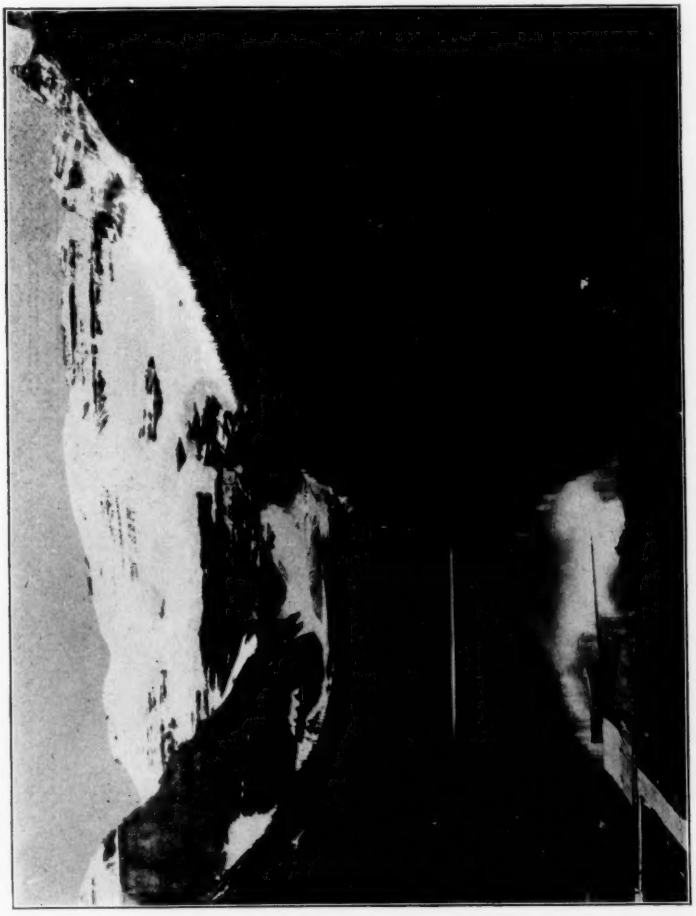


FIG. 4. LAKE LOUISE AND MOUNT VICTORIA.

stroyed. Westward, especially in the vicinity of Calgary, the Mecca of so many English younger sons, there are many ranches and everywhere over the plains may be seen bunches of cattle, flocks of sheep and droves of horses.

Fifty miles before Calgary is reached, the mountains may be seen rising above the western horizon like banks of snow. The range is entered near Canmore, twelve hundred and thirty-two miles west

FIG. 5. THE GREAT GLACIER OF THE SELKIRKS.

of St. Paul, and at an elevation of 4,200 feet. The railway follows the valley of the Bow, ascending it between the Fairholme and Kananaskis ranges to the Height of Land beyond Laggan, entering British Columbia at Field, in the shadow of Mount Stephen. The

region between Banff and Field, lying at the summit of the Rockies, presents some of the finest alpine scenery in the world. The ever-changing panorama of peaks and valleys, as the train crawls over the heavy grades and around the sharp curves, brings before the eyes of the traveller all the important features of a mountainous district—the snow fields, the glaciers, the torrents, the paths of the avalanches, the dips and folds of the strata, the sculpturing of the water, ice and wind, the deposition of sediment in the valleys, the forestation of the slopes, valleys and peaks, all are most perfectly displayed. Considered merely as scenery, the Canadian Rockies and Selkirks are incomparable; as fields in which to study the forces that regulate mountain building and river action, or to familiarize oneself with many of the fundamental laws of plant distribution they are unsurpassed. Nothing could be more magnificently demonstrated than glacial action at the Great Glacier of the Selkirks, where the student can walk over the terminal and lateral moraines, stand upon the surface of the ice, or creep through the blue caverns underneath its mass. At Laggan, with the splendid cirque at the head of Lake Louise and the enormous cliffs to the right and left, there is the most perfect presentation to the intellect and appeal to the emotions that nature can make.

From the summit of the Rockies, by the Columbia River and its tributaries, the railway penetrates the Selkirks, and by the valleys of the Thompson and Fraser, comes down to Vancouver and the Sound. Vancouver, with its 26,000 inhabitants and Victoria with 21,000, are two of the most interesting and delightful cities in Canada. Both are important shipping and outfitting points for Alaska and the Orient. At Vancouver, the terminus of the Canadian Pacific Railway, there are extensive warehouses to accommodate the transcontinental and transpacific business. At Victoria are the Houses of Parliament and the British naval station of the north Pacific. Both cities are thoroughly provided with all the conveniences and refinements of life; their hotels and clubs are equal to any in Canada and their situation could scarcely be improved commercially, scenically, climatically or socially.

From Victoria to Port Renfrew, near which the Minnesota Seaside Station is situated, is a distance of some seventy miles along the west coast. The trip through the Straits of Georgia from Vancouver to Victoria and from Victoria to Port Renfrew through the Straits of Fuca, enables one to obtain a very good idea of the Sound country with its dense forests, rocky islands and snow-capped mountains.

XUM

The photographs accompanying this paper will convey the impression of the country more fully and accurately than words can do. The admirable summer climate of Assiniboia, Alberta, and especially western British Columbia, can, however, scarcely be presented in a picture, and claims a word in closing. Along the west coast of Vancouver nearly a hundred inches of rain falls during the year. This great precipitation takes place principally during the winter and early spring, yet, even in mid-summer rainy days are not unknown. The climate is much like that of southern England and is

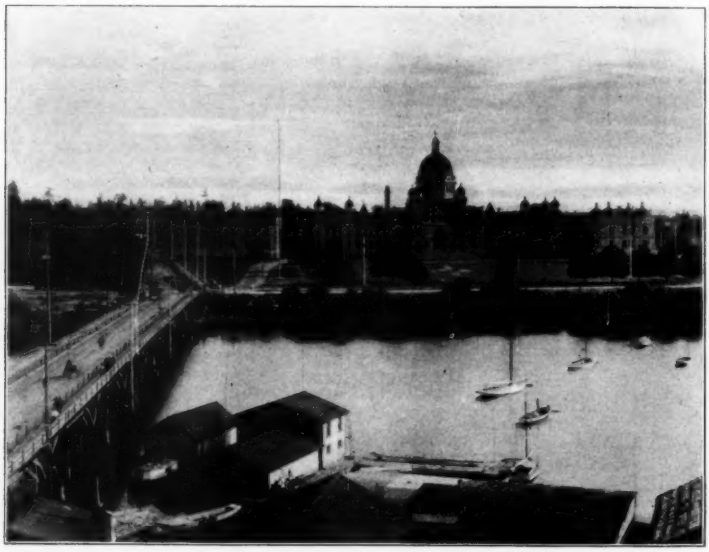


FIG. 6. PARLIAMENT BUILDINGS AT VICTORIA, B. C., WITH OLYMPIC MOUNTAINS IN BACKGROUND, SEEN ACROSS THE STRAITS OF FUCA.

reflected in the splendid forests of the coast as well as in the charming complexions of the women of Victoria. A Californian luxuriance of flowers extends at least as far north as the Straits of Fuca.

The buildings of the Minnesota Seaside Station stand beside the sea in a cove, from which a magnificent view of the Olympic Mountains is obtained. To the right across the Straits of Fuca looms Cape Flattery, off the point of which Tatoosh light gleams steadily through the night. A walk of a few rods takes one to the lookout

west of Station cove and the cliffs upon which the surf beats in from the broad Pacific. Behind the buildings is the primeval pine, cedar and spruce of the island, many of the trees being of enormous size. In front is a diversified shore of slate, sandstone and granite, broken up into a labyrinth of pot holes, diminutive fjords, with numerous surf caverns and some sandy beach. The opportunities for the growth of a great variety of plants and animals is excellent and the shore is consequently unusually rich.

During the season of 1902 the work will be organized as follows: General direction and special work on brown algæ, Conway MacMillan, University of Minnesota; direction of zoölogical work, Raymond Osborn, Columbia University; special work on red algæ, K. Yendo Rigakushi, Imperial University of Tokyo; special work on green algæ, Josephine E. Tilden, University of Minnesota.

The members of the party desiring formal instruction will be organized in classes for daily work; those wishing to pursue independent research will be given such assistance or encouragement as they may desire. It is to be hoped that some Eastern naturalists will be able to make the journey with those from the central west who have already joined the party. If any wish to do so, they are invited to communicate with the author of this sketch.

DECISIONS OF THE U. S. BOARD ON GEOGRAPHIC NAMES, JUNE 5, 1900, TO JANUARY 8, 1902

III

Robins; point on Gunpowder neck, Harford Co., Md. (Not Robbins nor Robin.)

Robins; creek and marsh, Chincoteague bay, Worcester Co., Md. (Not Robbins, Robbin's, nor Robin.)

Note: This is a reversal of the decision Robin made in May, 1901.

Rockawalking; creek, post office and railroad station, Wicomico Co., Md. (Not Rock-a-walkin.)

Rockhall; district No. 5, Kent Co., Md. (Not Edesville.)

Rollers Ridge; township, Benton Co., Ark. (Not Roller Ridge.)

XUM

Sail; island off False Point Pybus, Frederick sound, southeastern Alaska. (Not Ship.)

Salisbury; township, Lehigh Co., Pa. (Not Salsberg, Salsburg, nor Salsbury.)

Sanford; cove in Endicott arm of Holkham bay, southeastern Alaska. (Not Sandford.)

Sankaty; head or bluff, at east end of Nantucket island, Mass. (Not Sancoty, Squam nor Sweseckechi.)

Scajaquada; creek, in Buffalo, Erie Co., N. Y. (Not Seajaquada nor Scajaquady.)

Scarboro; creek and railroad station, Worcester Co., Md. (Not Scarborough's.)

Scraggy; islet in Salisbury sound, southeastern Alaska. (Not Samoilof.)

Scull; islet in Young bay, Stephens passage, southeastern Alaska. (Not Skull.)

Sedgeunkedunk; stream, trbutary of Penobscot river, Penobscot Co., Me. (Not Segeunkedunk.)

Seeley; creek, Sauk Co., Wis. (Not Seely.)

Sesachacha; pond, Nantucket, Mass. (Not Sachacha, Sasacaeheh, nor Sechacha.)

Shimmo; point, Nantucket Harbor, Nantucket, Mass. (Not Abram nor Shemo.)

Shoals; point, the southeastern point of Kruzof island, Sitka sound, southeastern Alaska. (Not First, Low, Nizmennia, Otmelci, Outer Point of Shoals, nor White's.)

Shoshone; river, tributary to the Big Horn river, Bighorn Co., Wyo. (Not Stinking Water.)

Note: The Legislature of the State of Wyoming passed an act which was approved February 14, 1901, as follows:

"*Be it enacted by the Legislature of the State of Wyoming:*

Section 1. That the name of the stream of water known on the map of the United States as the Stinking Water River, situated in Big Horn County, Wyoming, and emptying into the Big Horn River, is hereby changed to the Shoshone River, and shall be hereafter designated and known as such.

Section 2. This Act shall take effect and be in force from and after its passage."

Slide; point on the mainland, the north point of entrance to Redyerd bay, Behm canal, southeastern Alaska. (Not Eva.)

Smoke; creek, south of Buffalo, Erie Co., N. Y. (Not Smokes.)

Soudabscook; river, Penobscot Co., Me. (Not Soadabscook nor Sowadabscook.)

South Gabouri; creek, Ste. Genevieve Co., Mo. (Not South Fork Gabor nor South Gabori.)

Spruce; island off Pybus bay, Frederick sound, southeastern Alaska. (Not Yelowy nor Yellowy.)

St. Helens; mountain, in Skamania Co., Wash. (Not St. Helen.)

St. Peter; creek and flat, Ferry Co., Wash. (Not Rock.)

St. Vrain; creek and precinct, Weld Co., Col. (Not St. Vrains.)

Stansbury; creek, branch of Middle river, Baltimore Co., Md. (Not Stansberry.)

Stansbury; point, Back river, Baltimore Co., Md. (Not Stansberry.)

Starr Hill; township, Washington Co., Ark. (Not Starhill.)

Steele; point, the eastermost point of Hinchinbrook island, Prince William sound, Alaska. (Not Bentinck nor Steel.)

Stickel; hollow, Perry township, Fayette Co., Pa. (Not Stickle.)

Stockade Beaver; creek, branch of Beaver creek, Weston Co., Wyo. (Not East Fork nor Little Beaver.)

Sumdum; island in Endicott arm of Holkham bay, southeastern Alaska. (Not Sand nor Soundon.)

Swaderick; creek, tributary to Gunpowder river, Harford Co., Md. (Not Sundricks, Lauderick, nor Ludowick.)

Swan; lake in Swanville, Waldo Co., Me. (Not Goose (pond).)

Taylorville; village, Worcester Co., Md. (Not Taylor nor Taylorsville.)

Teays; P. O. and valley, Putnam Co., W. Va. (Not Teyes, Teayse, nor Teazes.)

Tilhance; creek, Berkley Co., W. Va. (Not Tilahanchee, Tilhancos, Tilehance, Tillehances, etc.)

Toluca; P. O. and R. R. station, Los Angeles Co., Calif. (Not Lankershim.)

Trots; hills, Nantucket, Mass. (Not Trott's.)

Turner; island between Big Koniuji and Nagai island, Shumagin group, Alaska. (Not Stiernfeld.)

Turville; creek, tributary to Isle of Wight Bay, Worcester Co., Md. (Not Taylors, Turval's, Turvill, etc.)

Tuttle; lake, Polk Co., Wis. (Not Swahn.)

Two Lick; creek, P. O. and R. R. station, Indiana Co., Pa. (Not Two-Licks, Twolick, etc.)

XUM

Vailsgate; P. O. and R. R. station, Orange Co., N. Y. (Not Vailgate nor Vail's Tollgate.)

Vieques; island off eastern end of Porto Rico, W. I. (Not Biequi, Crab, Viequez, etc.)

Walker; P. O. and R. R. station, Baltimore Co., Md. (Not Walkers Station nor Walkers Switch.)

Wapsipinicon; river, in eastern Iowa. (Not Wabes-pinicon, Wapsie nor Wapsiepinnecon.)

Watson; creek on east side of Gunpowder river, Harford Co., Md. (Not Waterson, Waterton nor Watsons.)

Weisenberg; P. O. and township, Lehigh Co., Pa. (Not Weissenburg, etc.)

Welsh; P. O. and R. R. station, Chambers Co., Ala. (Not Welch.)

West Point; United States Military Academy, New York. (Not Westpoint.)

West Point; city, militia district and post office, Troup Co., Ga. (Not Westpoint.)

West Point; district, post office and town, King William Co., Va. (Not Westpoint.)

Weweeder; ponds, Nantucket, Mass. (Not Weedweder nor Weeweder.)

Wharton; creek, Madison Co., Ark. (Not Warton's nor Whorton.)

Wharton Creek; township, Madison Co., Ark. (Not Whorton Creek.)

Whites; run, Indiana Co., Pa. (Not Whites Spring.)

Whiting; P. O. and R. R. station, Ocean Co., N. J. (Not Whiting's.)

Whitley; township, Crawford Co., Ark. (Not Whitney.)

Whittington; point, Chincoteague bay, Worcester Co., Md. (Not Willington's.)

Wigwam; pond, Nantucket, Mass. (Not Toochka nor Toupehue.)

Wosnesenski; island off south shore of Alaska peninsula and west of Unga island, Shumagin group, Alaska. (Not Crested, Peregrebnoi, Unatkuyuk, Vozoyehenski, Vossnesensky nor Wossnessenski.)

Yeates; mountain, Yancey and Madison Co., N. C. (Not Yates.)

Yellow; point on eastern shore of Tamgas Harbor, Annette island, southeastern Alaska. (Not Signal.)

Yucaipe; creek, and valley, San Bernardino Co., Calif. (Not Yucaipa.)

GEOGRAPHY CURRENT

CARTOGRAPHY

A Useful Base Map of the United States.—The United States Geological Survey has recently issued a reprint of a map of the United States whose convenient size recommends it for many uses. It is 11 by 16 inches, printed in blue and black; blue for the drainage and water features, and black for names and boundary lines. The principal cities, lakes and rivers, and the state lines are the only features shown, so that, free from confusing details, it forms an excellent base map for a variety of purposes. It may be used to plot railroad lines, weather reports, crop, mining, lumber, oil and gas returns, the limits of commercial territory and zones of trade, and many other statistics, and it is useful in educational work. The map is such that it can readily be framed for reference or used as a desk map under glass. It may be had for five cents on application to the Director of the U. S. Geological Survey. G. B. H.

CLIMATOLOGY

Twilight in the Tropics.—Here comes science now taking from us another of our cherished beliefs—the wide superstition that in the tropics there is almost no twilight, and that the "sun goes down like thunder out o' China 'crosst the bay." Every boy's book of adventure tells of travellers overtaken by the sudden descent of night, and men of science used to bear out these tales. Young, in his "General Astronomy," points out that "at Quito the twilight is said to be at best only twenty minutes." In a monograph upon "The Duration of Twilight in the Tropics," S. I. Bailey points out, by carefully verified observation and experiments, that the tropics have their fair share of twilight. He says: "Twilight may be said to last until the last bit of illuminated sky disappears from the western horizon. In general it has been found that this occurs when the sun has sunk about eighteen degrees below the horizon. * * * Arequipa, Peru, lies within the tropics, and has an elevation of 8,000 feet, and the air is especially pure and dry, and conditions appear to be exceptionally favorable for an extremely short twilight. On Sunday, June 25, 1899, the following observations were made at the Harvard Astronomical Station, which is situated here: The sun disappeared at 5:30 P.M., local mean time. At 6 P.M., thirty minutes after sunset,

XUM

I could read ordinary print with perfect ease. At 6:30 P.M., I could see the time readily by an ordinary watch. At 6:40 P.M., seventy minutes after sunset, the illuminated western sky was still bright enough to cast a faint shadow of an opaque body on a white surface. At 6:50 P. M., one hour and twenty minutes after sunset, it has disappeared. On August 27, 1899, the following observations were made at Vincocaya. The latitude of this place is about sixteen degrees south, and the altitude 14,360 feet. Here it was possible to read coarse print forty-seven minutes after sunset, and twilight could be seen for an hour and twelve minutes after the sun's disappearance." So the common superstition about no twilight in the tropics goes to join the William Tell myth and the Joan of Arc martyrdom.—*Harper's Weekly*, April 5, 1902.

HYDROGRAPHY

The Crystal Springs of Florida.—Nearly all of the streams of Florida originate in large springs of remarkably clear water. Some of these springs form lakes of considerable dimensions while others flow off directly in bold streams. In many of them the water boils up from the bottom at many different points within a small area, generally a circular basin, nearly surrounded by high sloping banks, and having a depth of from twenty to forty feet. The water is so clear that the most minute objects, even on the bottom, are readily distinguished, and large streams of crystal water can be seen gushing up through the white colored limestone beds beneath. At points remote from these inlets the bottom is covered with the long green moss that grows only in pure spring water. Beautiful fish of many varieties are plainly visible everywhere. The outlets of the springs are generally deep, narrow, and rapid streams. Of so much importance are these river producing springs that the United States Geological Survey, in its investigation of the country's water resources, has made a series of measurements of their discharge. One of the characteristic springs, which was measured by Mr. B. M. Hall, the hydrographer of the Geological Survey in Florida, is Silver Spring, near Ocala, in Marion county. It is the head of Oclawaha river and is also the head of navigation, as steamboats come up the river into the spring and have a regular landing wharf there. The river flowing out of the spring was found to be sixty feet wide. It had a mean depth of eleven feet, a mean velocity of nearly one foot and a quarter per second, and a discharge of 822 cubic feet per second. The spring basin is about 35 feet deep and the temperature,

late in December was 72 degrees F. Though the water has a slight limestone taste, it appears to have no other mineral constituents and is excellent for drinking. G. B. H.

The Lava Plateau of the Northwest.—Some of the results of the recent field work of Professor I. C. Russell in the northwest, which have been published by the U. S. Geological Survey, in its series of Water Supply and Irrigation Papers, Nos. 53, 54, make available information of considerable educational value regarding that section. The papers contain a clear and readable statement of the geologic history and the characteristics of the lava flooded country of Washington, Oregon, and Idaho, which is so extensive and unique as to be classed among the great physical features of the country. The nature of the outflow, and its depth, amounting to several thousand feet in thickness are discussed, as are a number of other interesting phenomena connected with it such as the "steptoes," or island-like areas in the sea of lava, and several noticeable breaks and faults supposed to have been caused by the enormous weight of the superimposed lava mass. The residual soils, due to the disintegration of the lava beds, are of noted richness and produce large crops of wheat. These soils are described and their composition noted, and throughout the papers a number of interesting side lights are thrown on the effect of a widespread geological formation of this peculiar nature on human life and development. An example of this influence is found in the important question of water supply, for the increase of which these studies were undertaken.

The physiography of the region receives especial attention. It is of more than ordinary interest on account of the unusual eruptive character of the country. Some of the more important physical features are illustrated in the great faults already mentioned; in a number of interesting folds of the lava beds, due to the cooling of the mass, which are likened to waves and swells on the ocean; and in the grandeur of the erosive work of the rivers, as shown in the profound canyons cut by them, some of which with their accompanying mountain scenery even rival the Grand Canyon of the Colorado.

Both antecedent and consequent streams are represented in the drainage system and present a number of interesting problems in stream development and adjustment. Of special interest among them is the Clearwater river, which has excavated a canyon along a steep, sloping mountain side, instead of descending to the adjacent valley, illustrating the persistence in its course of an antecedent stream

during the movement of the crust which produced the monoclinal fold along which it flows.

The paper, published in two parts, is copiously illustrated with halftones and is entitled: "Geology and Water Resources of Nez Perce County, Idaho"; it may be had on application to the Director of the Geological Survey.

The series of Water Supply and Irrigation Papers, in which Professor Russell's report appears, are issued by the Division of Hydrography of the United States Geological Survey. They cover all the phases of the work of that Division in its study of the water resources of the country. Among the topics treated are—western irrigation problems; the disposition of city sewerage which would otherwise result in stream pollution; artesian waters and the geology of their occurrence; the use of windmills for the increase of water supply; problems of water storage; the results of stream measurements; and other matters of general interest. Copies of such of these papers as still remain in print may be had on application to the Director of the U. S. Geological Survey, Washington. Each number contains a list of the preceding publications of the series. Much information of an educational nature is contained in the Water Supply Papers and they may be made a valuable part of the school equipment for the study of geography. G. B. H.

The Tidal Bore of the Petitcodiac River.—The Bay of Fundy is known to the world chiefly on account of its tides, which rise to an immense height. As these tides reach the head of the bay and are forced up the Petitcodiac River the conditions are such as to form the front into an almost perpendicular wall of water termed a "bore." This formation is a grand and exciting spectacle, and interest in the phenomenon is increasing. Large numbers of American tourists, scientific men and others, visit the locality to admire its effects and study its causes.

About nineteen miles from the mouth of the Petitcodiac, at a point commonly known as the "Bend," the river takes a turn almost at right angles to its previous course. Immediately above the Bend and on the line of the Intercolonial Railway is situated the town of Moncton. The run of the rising tide first breaks into a bore at Stony Creek, eight miles below Moncton. At first it is scarcely noticeable, but it gradually grows until at the Bend it about reaches its maximum height. The wharves of Moncton are thus the most popular positions from which to view this interesting phenomenon. The

average interval from the arrival of one bore to the arrival of the next is about twelve hours and twenty-five minutes, so that the average retardation from day to day is about fifty minutes. But "his boreship" is erratic, and the daily retardation may be anywhere from forty minutes to an hour.

The best time to see the bore is during the full moons of August, September, or October; and if the visitor would see this natural wonder in its most beautiful aspect let him choose a bright moonlight night rather than the daytime. Under such favorable circumstances a crowd of four or five hundred people, one day last fall, witnessed the arrival of the bore. The schedule time for its arrival, given by the local newspapers, was 9:20 o'clock. At 9:12 the expectant crowd on Moncton's wharves heard a noise easily distinguishable as the rush of distant waters. This grew louder and louder as the bore approached and rounded the Bend, and at 9:22, two minutes later than the schedule time, there appeared in full view of the spectator, a vertical wall of water, five or six feet in height, rushing madly against the swift current of the stream. In some places along the head of the bore, the water, beaten into foam by its own violence, sparkled in the moonlight, while along the shore the mud ploughed from the bank made the water almost black. The contrast was beautiful.—*Self Culture Magazine,* November, 1899.

PHYTOGEOGRAPHY

Ceará Wax.—The *South American Journal* recently published an article from a contributor regarding "carnuba wax," called Ceará wax in the United States, which is characterized as "one of the most curious products of nature," and which is produced in the form of a powder or dust on the leaves of the carnuba palm tree (*Coryplia cerifera*). This variety of the palm is found in vast numbers on the margins of the river Jaguaribe and its affluents in all the districts of Aracaty, as well as along other rivers in the State of Ceará. It is also found in smaller areas in the adjoining States of Piauhy, Parahiba, and Rio Grande do Norte.

Although the tree has many other qualities which render it of service to man, its most valuable product is its wax. Last year the amount of this wax exported was about 1,000 tons. One firm in Aracaty sent over 500 tons to the United States and Europe. The United States consumes the largest quantity in the manufacture of phonograph and gramophone record cylinders. The wax is also used

in stearine candle preparations for the purpose of giving the candles firmness and adding brilliancy to the flame. Another use is to give lustre to yellow and russet boots and shoes and to harness, while it is also used as a polish for hardwood floors.

The crop is gathered and prepared from September to March, that being the summer season in Ceará. In favorable seasons the tree is richest in wax about the middle of January. From each tree about six young leaves not yet fully opened are gathered by means of pruning shears fixed upon a long pole, and this is repeated twice more during the season. The first quality of wax is produced from the tenderest leaves. Generally it takes from 2,000 to 5,000 leaves to produce enough powder or dust to make 15 kilograms of wax. The leaves, when gathered and selected—first and second quality—are laid out in the sun to dry for two or three days. When dry they may be put into a storehouse for an indefinite time or until required for use by the producer. The leaves are then covered by a whitish dust or powder, which is brushed off in a tightly closed room. The leaves are then beaten with switches, the dust falling to the floor. This dust is afterwards swept up, placed in a tin vessel half full of boiling water, and kept boiling for fifteen or twenty minutes, when the wax gathers in a mass on the top of the water. It is then removed and placed in a coarse-meshed, cotton cloth strainer to allow any water to drain off. When dry the result is a mass of light yellow, hard, vitreous wax. After the powder has been extracted the palm leaves are used in the manufacture of hats, matting, and brooms. A fibre called *tucum* is also obtained from the leaves, while in some parts of the country the leaves are used in thatching houses. The fruit of the tree has a black pulp of a sweetish taste and is eaten both by human beings and animals. The seed resembles a small cocoanut, and makes good food for pigs. It is used also as an adulterant for roasted coffee after it is ground.—*Bull. Bur. Am. Rep.*, November, 1901.

ANTHROPOLOGY

Foreign-Born Population in America.—The population of the United States in 1900 which was of foreign birth numbered 10,356,644, being 13.7 per cent. of the total population. The proportion was smaller than in 1890 by 1 per cent., owing, doubtless, to the diminishing immigration and the return of immigrants, on account of the prevailing depression in business.

The countries which have contributed most largely to the foreign element are as follows, with the number from each:

Germany	2,666,990
Ireland	1,618,567
Canada and Newfoundland	1,181,255
England, Scotland and Wales (Great Britain)	1,169,626
Norway, Sweden, and Denmark	1,064,309
Italy	484,207
Russia	424,096
Poland	383,510
Austria	276,249
Bohemia	156,991
Hungary	145,802
China	81,827

The above figures, together with those of former censuses, show that great changes are going on in the constitution of the foreign-born element of our population. We have statistics of each census since 1850. At that time the Irish formed the principal element, constituting not less than 42.85 per cent. of the total foreign element. This proportion has steadily diminished for half a century, until now the Irish form only 15.62 of the foreign-born element. In 1850 the Germans were second, with 26 per cent., and in 1860 they increased 31 per cent., and held a proportion of about 30 until the last census, when their proportion has diminished to 25.75 per cent. The third element was the British, including natives of England, Scotland, and Wales, which in 1850 formed 16.89 per cent., or about one-sixth of the foreign-born element. That proportion has diminished quite steadily, until in 1900 it was only 11.29 per cent. Thus these three, the largest elements in 1850, have all diminished proportionately. The next element of magnitude was the natives of Canada, which formed in 1850 6.58 per cent., and now form 11.45 per cent.

In 1850 there were no other nationalities represented in any considerable number. The natives of Scandinavia—Norway, Sweden, and Denmark—formed less than 1 per cent., and they now form a trifle over 10 per cent., having increased continuously during the half-century. The Russians were very few in number, but now number over 4 per cent. Hungary was not represented at all, but now has 1.4 per cent., and Bohemia, which is first represented in 1870, now has 1.5 per cent. The Poles first appeared in the census of 1860, with a fraction of 1 per cent., and they now have 3.7 per cent. The Italians in 1850 formed .16 of 1 per cent., but have in-

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creased steadily, and in recent years quite rapidly, forming in 1900 4.67 per cent.; and the Chinese, whose numbers were absolutely trifling in 1850, increased up to 1880, when they formed 1.56 per cent., and since then, owing to the Exclusion Act, they have diminished, thus demonstrating its efficiency.

Thus the Russians, Huns, Poles, and Italians, collectively, which fifty years ago were present in this country only in trifling numbers, have increased until now they form 13.86 per cent., or about one in seven of the entire foreign element; while the British, Irish, and Germans, which half a century ago formed not less than 86 per cent. of the foreign-born population, now constitute only a trifle over half of it.—*Bull. Amer. Geog. Soc.*, Vol. XXXIII, No. 5, 1901.

The Cape to Cairo Telegraph.—The line has now been completed as far as Ujiji, on the eastern shore of Lake Tanganyika, so that messages may now be sent from Cape Town about 2,500 miles north. The wire has been strung on insulated iron poles sent out from England. Of course, the wild nature of the country has made the work difficult, for it has been necessary to transport all material by human or animal portage for hundreds of miles. Five parties are now engaged in the work, the total force averaging 10 white men and about 1,200 blacks. The advance party, consisting of 2 whites and 200 natives, has charge of surveying the route and clearing a path for it about 15 feet in width. The second party follows two or three days after, and widens the path to 60 feet, more or less, according to the nature of the country. It is easy to see why so wide a path is necessary. There will be no lineman every few miles to keep the service in repair, and it will be far more costly than in civilized lands to mend a broken wire or repair other damages. Every preliminary caution, therefore, must be taken. Then comes the third party, which digs the holes; it is closely followed by the fourth detachment, which plants the posts; and, finally, come the wire stringers, who complete the work. None of the iron posts weighs less than 160 pounds, and most of them are 14 feet high. For some time the work has been carried on in German territory, as the line passes completely through the western part of German East Africa. It was necessary, of course, to secure the consent of Germany to build the line through its territory, and the Trans-African Telegraph Company, as it is called, agreed as a part of the bargain to build a separate line across German East Africa from north to

south, to be the property of the German Government, and to be used wholly for the telegraph traffic of the German colony. The Government will connect its ports on the coast with the Ujiji station of the line. This great enterprise will now be pushed northward into British East Africa, and down the Nile as far as Fashoda, which is connected by wire with Khartum and Alexandria.—*Electrical World and Engineer.*

Commercial Geography.—Mr. J. C. Search, President of the National Association of Manufacturers, in an address recently given before the convention of the Eastern Commercial Teacher's Association, illustrated in a very apt way the necessity of a knowledge of Commercial Geography for merchants and manufacturers engaged in foreign trade. He said "A knowledge of the trade centres, ports of entry, and chief distributing centres in various countries is of great consequence, and of no less importance is familiarity with means of internal transportation, and the channels by which commerce moves inland from the seaports and distributing centres. It is surprising to what extent men who have mastered even great business problems are sometimes ignorant of the principles of geography. It is well to know that while throughout all the rest of South America Spanish is the current language, Portuguese is the language of Brazil. One should know that Hong Kong is not a part of the Chinese Empire, but a British colony. I have known manufacturers to refer an inquiry from Bogota, Colombia, to an agent in Caracas, Venezuela, without knowing or without thinking that communication between these two capitals is only by an overland route, across a wild country, or by a long circuitous route by rail and water, which makes the two cities further apart, commercially speaking, than either of them is from the city of New York.

"Knowledge of the fact that Java is a Dutch colony suggests that the trade of that far-distant island can be sought to good advantage in Amsterdam, because all of the great Dutch trading companies have their main offices there.

"Information concerning the sources of supply of leading articles of commerce is of great utility, indicating where certain goods may not be sold. For instance: We may not expect to sell cotton yarn in Bombay, if we have knowledge of the existence of a great shipping industry in India. On the other hand, knowing the fact, it indicates that textile machinery and other supplies are salable there. There is no longer a market for American flour in Argentina, but

we can furnish the milling machinery with which to utilize a portion of the vast wheat crop of that country, and this we do."

E. D. J.

Leather Tanning at Woburn.—The city of Woburn, on the outskirts of Boston, is the most famous seat of the leather-making industry in the United States. Before it was incorporated by the General Court of Massachusetts Bay Colony in 1642 it had tan vats and beam houses. This trade, originally handed down from father to son, was in the early days chiefly carried on in winter, the summers being devoted to farming. An interesting article in *Hide and Leather* of March 29, 1902, says: "In the old days methods were primitive. Holes were dug in the ground and boarded to make them watertight. Into these tan-liquor was put, say, two feet deep. A whole hide was spread upon the liquor and covered an inch deep with bark; another hide, another layer of bark, and so on until the pit was full, about thirty-five hides being required to fill it. For from sixty to one hundred days the hides were subjected to this treatment. To-day as many hours will suffice, and better results are obtained. The output in the olden time was small. Seventy years ago 1,000 hides per year was a large product. Factories in Woburn and Winchester (set off from Woburn in 1850) to-day have a capacity of 2,500 hides per day, and frequently are running up to their limit."

Cognate industries have naturally grouped themselves around the fundamental one of tanning at Woburn. At the beginning of the century, and for twenty-five or thirty years thereafter, the small shoe shop was a factor of Woburn's industrial life. The organization of the great modern factories has carried the business away to other localities, although large quantities of shoe stock are produced. Leather machinery makers naturally find a congenial location here, and Woburn has produced a score of inventors in this department alone.

The Civil War marked a boom in leather production. During this period Woburn had 25 tanneries employing 612 men. In 1884 there were 26 tanneries and 1800 men. Since that time the introduction of machinery and the absorption of tanneries into large concerns have lessened both the number of men and the separate establishments, but the output has steadily increased and Woburn leather is known in all parts of the world.

E. D. J.

Recent Articles on Commerce and Industry.—"Captains of Industry," *Review of Reviews*, April.
Coal Resources of the Pacific, *Engineering Magazine*, May.
Commerce in 1901, Our Foreign, *Consular Reports*, April.
Commerce, Department of, *American Trade*, April 1.
Commercial Museum of Philadelphia, *Harper's Weekly*, April 19.
Connecticut, Agriculture and Fisheries in, *Harper's Weekly*, April 5.
Connecticut, Manufactures of, *Harper's Weekly*, April 5 .
Dairy Farm (Briarcliff) *Country Life*, May.
Farming, Expansion of Winter, *Scientific American*, April 12.
Forestry, The Art of, *Country Life*, May.
Grain Elevator, Modern, *Engineering Magazine*, May.
Horse Trade of the United States, *Crop Reporter*, April.
Iron and Steel Industry, *The Manufacturer*, April 15.
Knitting Industry, *The Textile Record*, April.
Krupp Works at Essen, *Scientific American*, April 19.
Leather Industry, Bacteria in, *Hide and Leather*, April 12.
Manufacturing Statistics, *Bradstreets*, April 12.
Meat, Reason for High Prices (graphic), *American Agriculturist*, May 3.
Mexico, Commercial and Economic Conditions, *Consular Reports*, April.
Rice in Southwest, *Harper's Weekly*, April 19.
Salt Manufacturing in the Colorado Desert, *World's Work*, May.
Singapore as a Trade Center, *American Trade*, April 15.
Sisal Industry in the Bahamas, *Scientific American*, May 3.
Steamship, Growth of the Transatlantic, *Scientific American*, May 3.
Steel Rails, Manufacture of, *Scientific American*, April 26.
Tobacco Growing II and III, *American Agriculturist*, April 5 and 12.
Wheat, Fallacy of Exporting, *Review of Reviews*, May.
Zinc Production in United States, *Engineering and Mining Journal*, April 5.

The Pan-American Conference at the City of Mexico.—The first Pan-American Conference to which the United States was invited, was held in 1826 at Panama. The plan for the unity of the Americas which Blaine conceived in 1880, took shape later, and invitations were sent out in 1888, and the first Pan-American Congress was held in Washington in 1890–1. The second has just been held in the

City of Mexico and was presided over by Senor Raigosa of Mexico, he being chosen after Ex-Senator Davis refused the honor. The government of Mexico invited the following States, composing the union, to assemble for the session in the City of Mexico: United States of America, of Brazil, of Mexico, of Venezuela, Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Haiti, Nicaragua, Paraguay, Peru, Salvador and Uruguay. The session lasted from the 22d day of October, 1901, to the 31st of January, 1902. One measure adopted by the Congress receiving most attention is the plan of international arbitration. On the 15th day of January a general arbitration scheme was passed, reorganizing the principles of the Hague Convention, and if the plan is further consummated by treaties among the various American nations, it will be equivalent to compulsory arbitration. As it is now, the Hague rules are to be considered American public law by reason of a protocol agreement among the signatory states. The Chilean delegates persistently refused to adhere to a compulsory arbitration scheme and refused to sign the resolutions adopted. It might be mentioned in passing, that Chile has continually refused to settle her outstanding disputes by a resort to arbitration.

Just before the advent of the new year, the Congress adopted a recommendation for the establishment of a Pan-American bank whose chief centre is to be in New York with minor branches at the various capitals and commercial headquarters in North and South America. Among the other projects considered and passed was the creation of an International Sanitary Bureau whose main office is to be in Washington, and which is to hold conventions at certain intervals. It was also resolved that in a year a Customs Congress of technical experts should meet in New York and consider practical questions concerning customs and their administration for the purpose of simplifying regulations and of making a common nomenclature for merchandise, which is to be published in English, French, Spanish, and Portuguese.

A committee of five was appointed to further the construction of the intercontinental railway, whose mileage is now five thousand. The Bureau of American Republics was given larger duties, among the most important of which are the execution of certain plans recommended by the Congress and the dissemination of commercial information. The construction of an inter-oceanic canal by the United States was endorsed. An International Archæological Commission

was appointed to preserve the remains of the ancient civilizations in America. Resolutions were adopted recommending that the exhibits of the various countries be kept at the Philadelphia Commercial Museums, endorsing the Louisiana Purchase Exposition of 1903, the Olympian Games to be held at Chicago in 1904, and complimenting the management of the Pan-American Exposition recently closed.

Eight treaties and conventions were signed. Among them there were: an agreement between the American Republics for five years to refer to arbitration under the Hague rules all claims for pecuniary loss or damage against any nation. Each nation agreed to appoint at least one Anglo-Saxon to the International Court of Claims, so that there would not be an overwhelming membership of Latins.

An extradition treaty was completed, as was also an agreement for the international recognition of authority granted by the respective governments for the practice of the learned professions, with special provisions pertaining to the United States. Also a treaty for a commission of American and European jurists to prepare a code of American public international law, and of American private international law, as well as agreements for facilitating international copyrights, the exchange of government publications, the protection of patents, trade marks and the rights of aliens.

The United States delegation did not vote for the conventions pertaining to patents, trade marks and aliens, because of the necessity of modifying them to harmonize with laws of the Union. They agreed to all other conventions approved by the Congress.

Future International Conferences are to be held every five years unless postponed by mutual agreement. A. D. R.

GEOGRAPHY TEACHING

The School of Geography of the University of Oxford has published a report for the year 1901, which shows a commendable progress. The school was organized in October, 1899, and at the close of its second year can report an attendance in the three successive terms of 119, 36, 93. Both men and women are admitted, and five countries outside of Britain were represented.

A vacation course is offered primarily for teachers, from July 29 to August 19, 1902, with practical training and excursions.

Educational Value of a Government Report. —Much information and a valuable general idea of the country's regional conditions of climate and rainfall, and many instructive facts regarding the flow

of its principal streams can be had from Part IV of the Annual Reports of the United States Geological Survey. These volumes are devoted to the work of the Division of Hydrography, which consists in a broad study of the country's water resources. Part of the details are, of course, technical in nature, but a careful inspection of the reports reveals much of interest regarding such matters as the size of the drainage areas and the discharge of well-known streams, the great variation between the summer and spring or winter flow of many streams, and facts of interest in connection with the effect of forests upon stream flow.

A new and vivid impression is also received of the enormous economic value of the country's rivers for waterpower and supply, and for irrigation in the arid sections of the West.

Interesting features of the development of irrigation, which is such an important factor in the economic future of the arid lands, frequently appear, especially of the engineering methods employed in taking the water from the streams and applying it to the land. The numerous and instructive views taken at many points over the country are not the least suggestive or valuable portion of the reports.

Two papers of more than usual interest appeared in Volume IV of the Twenty-First Annual of the U. S. Geological Survey, which has just been issued. One is by N. H. Darton, on the geology and water resources of the Black Hills, a region of considerable hydrographic importance, as the water-bearing rocks which underlie the Great Plains are here upturned and largely receive the supply which appears later in the remarkable flowing wells of the Dakotas. The other, on the "Utilization of the High Plains," by W. D. Johnson, discusses the structure, the rich fertility, the baffling climatic conditions of limited and insufficient rainfall, which make this region, lying from northern Texas through western Kansas and eastern Colorado, one of the most interesting in the United States. The author also summarizes the facts of the historic attempt at settlements in the eighties which ended so disastrously to hundreds of settlers who were allured by the perfection of the land for agricultural purposes, but disregarded its semi-arid conditions. No more striking example of the dependence of economic progress on physical and climatic conditions than this paper presents can be had.

These reports are usually to be found in any good library, or may be obtained from members of Congress on application.

G. B. H.

School Geography in New York City.—Superintendent William H. Maxwell, City Superintendent of Schools of the City of New York, has recently announced to the principals of the grammar schools of the city a new basis for graduation, on which basis alone pupils will be awarded certificates of graduation. This establishment of a minimum requirement equalizes the standards of graduation at once, as it removes all power of the principals to set up personal minimum standards or to allow students to graduate through favoritism.

Details are given in reference to the general requirements in each of the several subjects of the elementary curriculum, those in geography being as follows: "1. Mastery of a school text-book. Do not misunderstand this. We do not mean by this that the pupil is to learn the geography text. We do not mean, in particular, that he is to memorize long lists of rivers, mountains, towns and capes, etc. We do not attach very much importance to that. We do attach importance, however, to the human side of geography, to learn of the earth as man's home. This includes the reciprocal influence of physical conditions on man and of man in utilizing physical conditions. It is to the getting out of these matters that concern men to which we refer particularly.

2. Knowledge of the important physical features of the continents, of the United States, of New York State. This requires no comment.

3. Power to locate the chief countries of the world, their great cities and foreign possessions, and to give and recognize their chief productions. We believe that if a child is shown a sample of wheat he should be able to identify it and tell something of its production. The same should be the rule with coal, wood, and similar staples.

4. Knowledge of the chief transcontinental and ocean routes. We refer in this chiefly to the great railroad systems, but we do not intend to exclude the Trans-Siberian Railroad, that now building from Persia, or the other great railroads.

5. Knowledge of the causes of dew, rain, snow, wind and other ordinary physical phenomena, and knowledge of the relations of place to climate. This knowledge should be gained, as far as possible, from observation and experiment, and not from books, although these may be used to supplement information acquired in the other way.

6. Ability to draw maps of the United States and of New York

State. We do not mean that the child's time should be wasted in drawing elaborate maps, shaded and colored carefully. This is not a wise use of the pupil's time. The great advantage from this exercise is to be gained in rapid sketching of outline maps and filling in the important towns and physical features.

7. Ability to find from inspection of a map the latitude and longitude of a given place, and to solve the converse problem. The solution of the converse of this proposition, of course, is to find the place when given the latitude and longitude. This seems a simple thing, and yet many persons who are ranked as well educated cannot locate a place when an index of an atlas has provided them with these data. The child should be able to locate points indicated by intersecting parallels on a map of the world."

It is interesting to note that the minimum requirement in the commercial aspect of geography is high, while the requirement in physical geography may be low. Climate as a causal influence in determining economic and social conditions is given appropriate prominence.

R. E. D.

Another Word about Geographic Exhibitions.—In this JOURNAL, February, 1902, pp. 77–78, mention was made of the collection of geographic maps owned by the Brooklyn Institute of Arts and Sciences, and available for use at their Museum. By the kind permission of the Director, Professor Franklin W. Hooper, arrangements have been made whereby this collection can be of service to those interested, but living at a distance. Professor Hooper has agreed to loan selected maps for use at geographical exhibitions, the borrower to pay the expense of shipment in both directions, and to assume responsibility for possible damages.

The maps in the collection are very valuable for school purposes, and the collection could well be drawn on to add to an exhibition, valuable school equipment not being easily accessible elsewhere. Applications should be made to the Editors of this JOURNAL, with statement of the maps desired.

The following list has been tentatively chosen for school purposes, and is merely suggestive.

No. 7. Broichman's map of the world. Conspicuous for very delicate and intelligent use of colors.

No. 27. Kiepert's physical map of North America. A good specimen of Kiepert's fine products.

No. 41. Library map of South America, from Stieler's Hand Atlas. (Six sheets pasted for wall map.) Well worth study as the best atlas map of that continent.

No. 94. The Alpine lands, by J. Wuster & Co., Zurich. A very fine Swiss map used in Swiss schools, and distinctly unlike most wall maps for school use.

No. 119. Map of France, by Habenicht, Justus Perthes' Map House, Gotha. A very fine school map.

No. 122. Hypsometrical map of France, published by Hachette & Co., Paris. One of the best specimens of French school maps.

No. 136. Map of the Netherlands, by J. B. Wolters, Grönigen. Colored to show the nature of the soils.

No. 148. Map of Italy, published by Paravia, Turin. Unlike the others given in this list it is not a superior product, but is interesting as a typical specimen of school wall maps used in Italy.

No. 158. Oro-hydrographic map of Asia, by Habenicht. One of the finest school maps published by Perthes.

C. C. A.

GEOGRAPHIC LITERATURE

BOOK REVIEWS

Notes on the Nicaraugua Canal.—Henry Isaac Sheldon. McClurg & Co. With maps and illutrations.

This work, originally published in 1897, now appears with addenda to bring it more up to date in view of later developments in the canal question. The book is not, as might be assumed, a thesis in favor of the Nicaraugua route as opposed to the Panama route. No reference is made to the rivalry between the two. The author gives a popular treatment of the question of the Nicaraugua canal, the result of personal inspection. He describes the topography and character of the country, its people, products and industries. A brief historical sketch of the canal project up to the present is given, the cost is estimated and prospects of successful completion and operation are favorably discussed. Of course much of this is now superseded by the Isthmian Canal Commission's work which has given definite and expert estimates on all these problems. The question whether the United States shall assist in the building or not is also a matter of history and shows how fast recent history has been making on this question.

A comparative treatment of other great canals is included giving information on the Suez, Manchester, Baltic, Sault St. Marie, Corinth, Chicago Drainage Canals.

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The work will give the general reader a good idea of the question now so prominently before the American people. For authoritative and late information in detail the student of the canal problem will look elsewhere.

MAGAZINE NOTES FROM TEACHERS' GEOGRAPHY CLUB.

Alaska, The Possibilities of.—C. C. Georgeson. Nat. Geog. Mag., March, 1902. Pp. 81–85.

An optimistic view of the possibilities of Alaska. The development of agriculture the first element in the building of a state, p. 84.

Chicago's Great River Harbor.—Flower Elliott. The Century, February, 1902. Pp. 483–492.

The writer has clearly portrayed the unique life of a river-harbor as developed by great commercial activities, and the ten illustrations are excellent.

Chicago river, for fifty years a drudge, has a fine future before it; before long it will be one of the great sights of Chicago, 483; house-boat on the Chicago; a fire on the surface of the river, 484; commercial growth beyond all expectations, 485; bridge and tunnel problems, 486–487; in tonnage of arrivals and clearances Chicago ranks fourth among all the ports in the world, 487–489; Uncle Sam as the guardian, 489–491; railroads and river craft have ready access to water frontage, 492; brick manufacturers have dredged North Branch to get clay, making this Branch a growing stream, 492.

Chile, Depressions and Elevations of the Southern Archipelagoes of.—Francesco Vidal Gormaz. Scot. Geog. Mag., January, 1902. Pp. 14–24.

A discussion of the following question: "Do the archipelagoes of Southern Chile owe their origin to elevations of the sea bottom or to depressions of the southern and western part of South America?" Observations made by the writer and others during the last fifty years showing the evidences of changes of elevation, and a discussion of the significance of the same. Partially drowned forests, 16–18; shells at high elevations not trustworthy evidence of elevation of land, 19–20; shoaling of bays due to sedimentation, 21–23.

Cotton Belt, Country Life in the.—Leon Vandervort. Outing, March, 1902. Pp. 642–649.

A contrast between the old times and the new in the South. Five illustrations of plantation life.

Cuba, American Progress in.—Illustrated. Nat. Geog. Mag., March, 1902. Pp. 97–108.

An account of the work done by the army of occupation in exterminating disease germs.

Desert, Across the Westralian.—Alexander Macdonald. Scot. Geog. Mag., January, 1902. Pp. 1–13.

Brief account of a journey in search of gold fields and containing much of interest. Description of natives, 9–11; birds as water guide, 12–13.

Dutch Canals, Skating on.—C. Edwardes. Outing, March, 1902. Pp. 663–666.

A good word picture of winter life in Holland; good reading for pupils.

The old fashioned skates and the people wearing them; the minister on his parish visits; the market woman with her basket of eggs balanced on her head. Interesting trips suggested; the Friesländer and Marken Islander; loss to the romance of Dutch life when Holland drains the Zuyder Zee.

Electric Transit in London and Paris.—Isaac N. Ford. The Century, January, 1902. Pp. 399–408.

This paper deals with the electric transit management as contrasted by London and Paris, showing their vital importance in the development of great centres of population.

Deep-level tunnels of London sixty feet below surface, 402; Rehousal of population in suburbs; congestion of central thoroughfares, 405; Octroi tax prime factor of the transit problem in Paris, 405; socialism and tunnelling near the surface lessens the expense of the Parisian method, 407.

Indian Hunter of the Far Northwest, The.—Tappan Adney. Outing, March, 1902. Pp. 623–633.

An account of Indian life in the Klondike region, with six full page illustrations of dog teams, Indians' homes and customs.

Description of Klondike river, the game found there, the Indian, his food, clothing and general appearance, 625–628; cooking the game and preparing the hide for tanning, feasting, 631; the caribou, the moose, and wolf, 633.

Lumber Industry of Maine, The.—Lawrence T. Smythe. New England Mag., January, 1902. Pp. 629–648.

An interesting and profusely illustrated article, giving a good account of the increase of the industry. A description of camp life; the work of cutting and hauling logs; the journey down the rivers to the mills—from thence to the lumber markets.

Magnetic Survey of the United States, with Chart.—L. A. Bauer. Nat. Geog. Mag., March, 1902. Pp. 92–95.

Fluctuations in magnetic needle, 93–94; magnetic observatories, 94.

Mountains, II.—James Geikie. Scot. Geog. Mag., February, 1902. Pp. 76–84.

A study of the modifying influences of agents of erosion upon mountain growth, and of the origin of plains, plateaus, and irregularities in the surface of a mountainous region. Formation of transverse river valleys, 77; formation of plateaus of erosion, 78; formation of plateaus of accumulation, 78; subsequent or relict mountains, 79–84.

Nuts of Commerce, The.—Robert Blight. Outing, March, 1902. Pp. 710–717.

Interesting facts told about our common nuts. Three full page illustrations. Hazlenuts, filberts, and walnuts in this and other countries, with derivation of names and history, 712; chestnuts of this and other countries, 714; peanuts, 715–717.

Ocean Currents.—James Page, U. S. Hydrographic Office. Nat. Geog. Mag., April, 1902. Pp. 135–142.

A good analysis of the cause of ocean currents, including an excellent description of the Gulf Stream and a brief account of the method of constructing ocean current charts.

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Ports in Old England, Pilgrim.—Edwin D. Mead. New England Magazine, December, 1901.

A description of ports connected with the Mayflower Pilgrims. Plymouth as the starting place of some of our explorers, Raleigh, Davis, Gilbert, Drake, is important historically, 410; some noted events in its history, 412.

Tusayan, The Snake Dancers of.—Charles Frederick Holder. New England Magazine, December, 1901.

A description of the Painted Desert in Arizona which the traveller crosses to reach Tusayan, the home of the Moki Indians, who have been driven there by the Apaches. An interesting presentation of one of their celebrations, the Snake Dance.

Washington City, The Improvement of.—Charles Moore. The Century, February, 1902. Pp. 621–628; March, 1902. Pp. 747–757.

The geographical study of the city of Washington must needs include a knowledge of its artistic creation by Major Peter Charles L'Enfant, 621; he imposed diagonal avenues on a rectilinear basis of streets, used artistically the axial treatment, 622; and combined art and nature in placing the buildings so as to achieve the best landscape effects. This theme is well outlined in the articles noted.

Salt Lake, Great.—James E. Talmage. Scottish Geographical Magazine, Edinburgh, December, 1901. Pp. 617–644.

A very interesting account of the history, characteristics, and life. Scenic glories, 622; fluctuations in volume and discussion of causes of same, 623–632; curious rainbow effects from sand held in air by wind, 636; salt manufacture, 637; animal life in the lake, 640; pleasure resorts, 642.

San Rafael and San Anselmo.—Carlotta Reynal. Overland Monthly, November, 1901. Pp. 373.

Old missions, and development of settlements, with pictures of Californian homes and foliage.

Trees, Our Wealth in.—By a Practical Forester. Munsey's Magazine, March, 1902. Pp. 778–779.

A short article showing how the Germans regard the importance of careful forestry. Germany leads the way in forestry education, 778; the training of the student; how the forest never grows less, though trees are felled each year.

Turkish Situation, The.—By an American born in Turkey. Review of Reviews, February, 1902. Pp. 182–191.

An article which would be helpful in throwing light upon the real causes of the Armenian massacres, the abduction of Miss Stone, and the relations between Turkey and the other Great Powers. Two maps. Abdul Hamid, 182; the Empire becomes Moslem, 183; minimizing the capitulations, 184–185; exterritoriality again asserted, 185; where the Sultan failed, 186–187; Armenian massacre and its cause, 187; Macedonian problem, 188–189; the Armenian remnant, 190; Persian Gulf issues, 190–191.

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SOCIETIES AND MUSEUMS.

AT the last regular meeting of the Geographical Society of Philadelphia, held on April 2, the address was delivered by Professor William M. Davis, of Harvard University, on the subject "The Lesson of the Colorado Canyon." Without disparaging in the least the grandeur and beauty of the canyon itself, the lecturer pointed out that the real lesson was revealed in its rocky walls. An examination of these disclosed the records of vast mountain systems of the past worn down to the level of a plain upon which had been depcsited thousands of feet of sedimentary rock. Through this superimposed mass the Colorado and its tributaries have made but a feeble beginning in the enormous work of denudation which is destined to result from its efforts in the future.

The president, Mr. Amos Bonsall, announced the award of the Elisha Kent Kane gold medal to Lieutenant Robert E. Peary. Dr. A. Donaldson Smith was the first recipient of the Society's gold medal after his return, more than a year ago, from his important researches in Africa. The presentation this year will be made at the annual meeting in May. Mrs. Peary is expected to be present at that time to receive the medal, which is to be conveyed by her to her husband, the indomitable Arctic explorer.

The active membership of the Society is at present somewhat over four hundred. The election of officers and directors for the ensuing year occurs at the annual meeting in May.

F. B. GREEN,
Recording Secretary.

NEWS NOTES.

IN Algeria, on the margin of the Sahara, the use of artesian well water has reclaimed 329,415 square miles of territory. This is an area almost as large as North and South Dakota, Minnesota and Michigan combined, and in it are 15,000 wells, irrigating 14,000,000 acres, and supporting a population of nearly 4,000,000.

THE managers of the great railways have begun to take thought for the morrow in the matter of forestry along their rights of way.

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The Illinois Central is planting extensively; the Baltimore and Ohio employs trained foresters, and the Pennsylvania Railway has established a farm, as an experiment, upon which they are planting 15,000 young locust trees, which will be cultivated until they are large enough for ties.

THE U. S. Weather Bureau statistics for 1900 record the destruction of 713 human lives by lightning. Of these 291 were killed in the open; 214 in buildings, and 57 under trees, the details of the other 151 not given. The greatest mortality is found in the Ohio Valley and Middle Atlantic States.

PROFESSOR EDWARD D. JONES offers several interesting courses in geography, along the lines of Higher Commercial Education in the University of Michigan. Some of the titles are: Commercial Geography of the Extractive Industries; Commercial Geography of the Manufacturing Industries; Resources and Extractive Industries of the United States, The Manufactures of the United States; The Distributive and Regulative Industries of the United States; Technique of Foreign Trade; European Commercial Geography.

National Geographic Society.—The membership of the National Geographic Society now exceeds 2,600, of which 1,700, or about two-thirds, are distributed throughout every state and territory in the United States. One-third of the members are resident in Washington. The National Geographic Society can thus very properly be called a Great National Organization. Members outside of Washington have all the privileges of the members in the city. By the new constitution they can vote and hold office. In fact, seven of the present Board of Managers of the Geographic Society are resident outside of Washington. The out-of-town members of the Board of Managers are: Dr. D. C. Gilman, Professor R. D. Salisbury, Professor Wm. M. Davis, Professor George Davidson, Professor Angelo Heilprin, Mr. Russell Hinman and Professor I. C. Russell.